This magazine is published to promote sound thought upon and concerning industrial medicine and traumatic surgery. To that end it will contain articles, news items, reports, digests and other presentations, together with editors' comments. The editorial policy is to encourage frank discussion. On this basis contributions are invited.

Industrial Medicine

Reg. U. S. Pat. Off.

The editors will exercise care in checking on the accuracy of data printed, but in all other respects articles and opinions of which expression is allowed are the opinions of their authors—the editors reserving in all cases the right to comment on the same, in the current or any subsequent issues, as they may be inclined.

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Third Silicosis Symposium

—Proceedings of the Third Meeting at Saranac Lake, N. Y., June 21-25, 1937—

THE Third Silicosis Symposium, given in connection with the Trudeau School of Tuberculosis at the Saranac Laboratory, Saranac Lake, N. Y., was held June 21-25, 1937, Dr. L. U. GARDNER, Director of the Saranac Laboratory, presiding.

The Third Symposium was attended by a larger number of persons than either of the other two meetings, contained more information, and was in all respects a better organized conference.

The program for the different days follows:

MONDAY, JUNE 21—Introductory remarks, DR. L. U. GARDNER, Saranac Laboratory.

"The Significance of the Silicotic Problem," DR. A. J. LANZA, Metropolitan Life Insurance Company, New York City.

"Etiology of Silicosis," DR. R. R. SAYERS, U. S. Public Health Service, Washington, D.C.

"Dust Concentrations and Their Measurement," PROF. PHILIP DRINKER, Harvard School of Public Health, Boston.

Discussion was led by M. T. DURKAN, Saranac Laboratory.

TUESDAY, JUNE 22—"Pathology of the Pneumoconioses," DR. L. U. GARDNER, Saranac Laboratory.

"Pathology of the Pneumoconioses; Correlation of Pathologic and Roentgenologic Findings," DR. L. U. GARDNER, Saranac Laboratory.

"Physiology of the Fibrotic Lung," PROF. W. S. MCCANN, University of Rochester School of Medicine, Rochester, N. Y.

WEDNESDAY, JUNE 23—"Roentgenologic Aspects of the Normal and the Silicotic Lung," DR. E. P. PENDERGRASS, University Hospital, University of Pennsylvania, Philadelphia.

"Roentgenologic Diagnosis of Silicosis," DR. H. L. SAMPSON, Trudeau Sanatorium, Saranac Lake, N. Y.

THURSDAY, JUNE 24—"The Clinical Picture and Diagnosis of Silicosis with Consideration of Disability," DR. A. R. RIDDELL, Ontario Department of Health, Toronto, Ontario.

"The Occupational History," D. E. CUMMINGS, Saranac Laboratory.

"Control—Medical Aspects," DR. A. R. RIDDELL, Ontario Department of Health.

"Control—Engineering Aspects," PROF. PHILIP DRINKER, Harvard School of Public Health.

FRIDAY, JUNE 25—"Administrative Aspects of Silicosis," D. E. CUMMINGS, Saranac Laboratory.

"Legislative Control and Compensation," T. E. WATERS, Occupational Disease Commission, Baltimore, Maryland.

First Day

DR. L. U. GARDNER made introductory remarks in opening the symposium referring especially to an exhibit of films in reference to reactions to different types of dust, the pathologic exhibit which contained many specimens of lungs and other organs, and the exhibit of experimental dust houses in which animal experimentation work was done, as well as the exhibit of dust collecting and counting apparatus.

In the absence of DR. A. J. LANZA, of New York City, DR. GARDNER referred to the original work of DR. LANZA in 1914-15 among the Joplin miners and also the subsequent broad mining experience of DR. LANZA. The problem apparently was two-fold: (1) the detection of cases of developed silicosis and their protection from tuberculosis, or treatment, or both; and (2) the discovery and elimination of dust hazards. The number of exposed workers in this country may run from approximately 500,000 to 1,200,000, as variously estimated. It is quite possible that 25% may develop silicosis at some time. Our task is to develop methods of supervision and dissemination of information.

DR. R. R. SAYERS, in presenting the subject "Etiology of Silicosis," considered his material under the following headings: definitions—history of dust diseases—silica—predisposing causes in silicosis, and tuberculosis and silicosis.

Regarding the predisposing causes of silicosis, no significance was attached to nationality, race, or age.

In reference to the association of tuberculosis and silicosis, figures were quoted showing increased incidence of tuberculosis among workers exposed to silica, quoting mortality rates in England and Wales, and mortality experience in life insurance companies, as well as extensive mortality.

In the discussion, DR. GARDNER, PROF. DRINKER and MR. CUMMINGS all commented on the theory of solution of free silica in human tissues.

In the afternoon session, PROF. DRINKER spoke on

"Dust Concentrations and Their Measurement." The various phases of this subject covered were the medical and engineering objectives—the concentrations found in industry—instruments and methods in use today—solubility of dusts—composition and analysis of dusts—and references.

The physician is interested in the hygienic appraisal of dust exposures; the engineer has a different objective, referring to damage to machinery, the nuisance in the community, and various similar factors.

Regarding instruments and methods in use today, of the settlement methods, rafter samples may present some inaccuracy, but they are widely used and quite informative.

The question of solubility must always be considered.

One can use alcohol as a collecting medium. In examining the particles, one cannot distinguish free silica from other dusts in our ordinary methods of counting. One must always remember that air-floated dusts probably differ a great deal from the original material — this is especially applicable to foundry dust.

The method of x-ray defraction compares densities photometrically and is apparently accurate within 5%.

In opening the discussion, MR. DURKAN, of the Saranac Laboratory, gave data on four examples of mixed dust exposure, including a ferruginous chert (50% iron and 50% free silica).

On the basis of these observations, two conclusions are apparently justified: (1) the composition of air dust may be considerably different from that of the original material; and (2) potential hazard is much less in mixed dusts than as indicated by the quartz content alone.

Second Day

DR. L. U. GARDNER presented an extensive discussion of the subject "Pathology of Silicosis and Other Pneumoconioses." In covering this subject, the different phases presented were as follows: methods of investigation—the general tissue reaction to injected dust in suspension—specific reaction to injected silica in suspension—pulmonary pneumoconiosis, including a consideration of pulmonary anatomy, pulmonary physiology, protective mechanisms of the respiratory tract, general response of lung to inhaled foreign particles, response to inhaled silica, response to mixtures of silica and other dusts, protective action of other substances, and response to inhaled fibrous asbestos—relationship between pneumoconiosis and tuberculosis, including methods of experimentation and results of experiments—types of pneumoconiosis in human beings covering nonspecific dust reactions, pure silica reactions, mixed silica reactions, and asbestos — complications in other organs—conglomerate simple silicosis and silico-tuberculosis—and secondary tuberculosis in intestines and larynx.

The greater part of DR. GARDNER'S presentation was much amplified in its descriptive qualities by the exhibition of a considerable number of very fine lantern slides, depicting gross pathological appearance, microscopic pathological appearance, and correlated with x-ray films of the chest. This was applied both to experimental material in animals and clinical material in human beings.

As a part of the discussion, DR. CAREY P. MCCORD briefly outlined his recent experience with experimental animals regarding the effects of ethyl silicate.

This substance is of bland type without any surface irritating properties. However, when injected into animals in the amount of 0.02 cc. per 100 grams weight of animal by peritoneal injections, lung damage occurred, accompanied by hemorrhage because of rupture of the capillaries. Intravenous injection in rabbits had the same results, producing air emboli of the brain; in such instances if the animal survived there was extensive damage to the kidneys. It is believed that ethyl silicate is an extremely toxic substance, but its relationship to silicosis is not as yet understood.

Consideration was then given by DR. GARDNER to pulmonary anatomy and physiology preparatory to discussing the reaction to dust in the tissues.

In the afternoon session, DR. GARDNER referred especially to the association of tuberculosis and silicosis, both in experimental animals and in human beings. A large number of lantern slides were shown exhibiting typical reactions to free silica, both accompanied by or in the absence of infection.

In summarizing, DR. GARDNER referred to the histologic findings in the x-ray and the corresponding x-ray appearances in the healthy lung, in the simple silicotic lung, and in the lung which showed silicosis with infection.

DR. WM. S. MCCANN, of Rochester, in completing the program for the second day, spoke on the "Physiology of the Fibrotic Lung." The subjects covered were a resume of normal respiratory function, considering the lungs as a tonometer, the nervous regulation of ventilation, capacity of the tonometer and the capillary bed of the lung—respiratory function of the fibrotic lung, including the effects of pulmonary fibrosis on the capillary bed of the lung, the effects of pulmonary fibrosis on the pleura and on the venous pressure, effects of pulmonary fibrosis on thoracic movements, on the nervous regulation of ventilation and dyspnea in pulmonary fibrosis.

Comments were made regarding the difficulty of getting proper material for this work. It is impossible to separate the ventilatory and circulatory phenomena. The complexity of nerve regulation afforded a difficult problem. Slides showing observations on various groups were exhibited and explained.

Third Day

DR. E. P. PENDERGRASS, University Hospital, Philadelphia, presented the subject 'Roentgenologic Aspects of the Normal and the Silicotic Lung," and illustrated his points by a large number of lantern slides. Consideration was given especially to the roentgenologic shadows of the soft parts, the bones, the pleura, the mediastinum, the heart, the diaphragm, hilus shadows, calcified nodes, the zones, the lobes, vascular markings, the bronchi, and the lung fields. The effect of the phases of respiration on the roentgen appearances in the chest was thoroughly discussed. The roentgenologic characteristics of silicotic lesions and asbestosis lesions were described and demonstrated.

The trunk shadows are often misinterpreted. An interpretation of peribronchial fibrosis is not justified by roentgenogram only. One should also keep in mind that the veins and arteries are of very dif-

ferent size and the difference in size varies as to the cycle of the heart beat.

In asbestosis, the vertical diameter of the chest is decreased with hyperventilation in the upper portion of the lung fields (this is reversed in silicosis)—also there is a thickening of interlobar septa and a thickening of the peripheral and basal pleura.

In concluding the discussion of Dr. Pendergrass' paper, DR. P. H. PIERSON, of San Francisco, described briefly some experiments in the determination of whether the lung could be rested by lying on the side which it was desired to rest. By experiments both on human beings and on animals, it was determined that the side on which the patient lay did more work than the upper side. The amount of movement was confirmed by noting positions of calcifications.

DR. HOMER L. SAMPSON, of Saranac Lake, presented the subject "Diagnosis and Evolution of Pneumoconiosis, (Silicosis in Particular)." Three different sets of lantern slides were used to illustrate various changes in the chest because of exposure to various kinds of dust. These included gypsum, cement, asbestos, porcelain, feldspar, granite, and haematite. Cases of silicosis, tuberculosis, tuberculosis and silicosis, bronchiectasis, aspergillosis, and miliary carcinoma of the lung, were also shown.

Standards of x-ray exposure were outlined, the usual standards being mentioned. The quality of the film depends upon density, detail, and contrast. It is important to understand that one must evaluate the film in spite of the knowledge of industrial exposure.

Statistics on iron miners to date have shown that of 8,500 studied over a period of one to four years, less than one-half of 1% have died of pulmonary tuberculosis; of those having nodulation, only 2% for the four years, or about one-half of 1% per year have died of pulmonary tuberculosis.

In discussing DR. SAMPSON'S paper, D. E. CUMMINGS, of Saranac Lake, gave various statistics on 6,800 haematite miners, of which 3,500 have been re-examined within a period of three years; in these, 44 cases of infection developed, of which 27 were non-tuberculous, 14 were tuberculous, and three were questionable.

Fourth Day

DR. A. R. RIDDELL, of the Ontario Department of Health, Toronto, Ontario, Canada, spoke on "Clinical Picture and Diagnosis of Silicosis, with Consideration of Disability."

A number of cases were demonstrated and reported, showing x-ray findings in the lantern slides and in certain instances the pathological findings by autopsy specimens.

Emphasis was placed upon the statement that complete reliance on radiography to the exclusion of other diagnostic methods may lead to error or partial error.

In silicosis the diagnosis depends upon: (1) history of inhalation of adequate quantities of dust containing silica; (2) information based upon appraisal of symptoms and clinical signs: (3) laboratory investigations; and (4) specific x-ray appearances.

In Canada, tuberculosis is not compensable without silicosis, even when it occurs in dust-exposed persons. Silicosis occurring after tuberculosis is compensable. A reduction of compensation in silico-tuberculosis has been made from 66⅔% of the wages to 50% of the wages.

During the afternoon session, DR. RIDDELL also presented "Medical Methods in Silicosis Control," discussing the functions of medical control, the South African system, the British system under the 1931 Act, the Ontario system, the New York State Act, individual industrial medical control, provisions for partial disability often inadequate and finally, the importance of tuberculosis. Lantern slides were used to demonstrate certain types of cases with reference to disability.

In general, the functions of medical control are to:

1. Demonstrate the occurrence of silicosis in specific industrial processes, and determine its importance in each;
2. Provide for the selection of working staffs so that unsuitable applicants, especially those in whom tuberculosis is present, are not placed in dust exposures;
3. Detect those already in exposure who have developed pulmonary tuberculosis or do develop it, so that such may be removed from exposure and contact with their fellow workers;
4. Detect the first development of silicosis in the individual worker and arrange his rotation to less dangerous work or his removal from work when this is considered necessary;
5. Supervise silicotics remaining in exposure at their accustomed work; and
6. Check the effectiveness of general methods of silicosis prevention.

In conclusion, DR. RIDDELL stated that silicosis is an occupational disease of declining importance—that engineering methods have met the problem so successfully that it will disappear in 15 or 20 years.

PROF. PHILIP DRINKER, of the Harvard School of Public Health, spoke on "Control of Silicosis—Engineering Aspects."

He first emphasized the fact that education is the real factor in putting physical examinations into general usage.

The objective of engineering control is to prevent disability from dust exposure or to improve general conditions. Standards of cleanliness, ordinances and their enforcement, methods, dust sampling for engineering control, and protective equipment were all discussed in detail. Lantern slides were used to show demonstrations of various types of engineering devices used in control programs.

As to standards of cleanliness, the standard of five million particles per cubic foot of air for pure quartz is a good figure and can be attained if great care is exercised.

There are instances of where mixed dusts have gone to concentrations in excess of one billion and where no silicosis has developed after long periods of exposure.

In exhaust systems, one can very easily check leaks by the use of a flashlight. Welded pipe is preferable to tin—velocities may vary from 2,000 to 5,000 feet per minute and, therefore, the elbows may be abraded, and wear out rapidly.

As a very simple and practical test for the efficiency of respirators, several men should be provided with respirators and be exposed to a black dust—one can very easily determine leaks by the dust on the face or by blowing the nose on a white cloth.

Fifth Day

D. E. CUMMINGS, in discussing "Administrative Aspects of Silicosis," used a series of lantern slides depicting the general scheme of ventilation in a mine, descriptions of drilling, blasting, and raising operations, fan installations, water curtains and water blasts, and the use of respirator units.

The various groups related to the problem were mentioned as follows: labor—industry—insurance carriers—physicians—engineers—lawyers—industrial commissioners—public health authorities—and research agencies.

The requisites in considering the administrative aspects of silicosis are: (1) methods of discovery of the disease and hazards; (2) the extent and character of disease as occurring in trades and individuals; (3) methods of control; and (4) a supervisory mechanism for methods of study.

Perhaps one of the greatest problems in the administrative aspects of silicosis is the neglect of records. Much can be done to improve this situation and avoid greater difficulties in the future.

From an economic point of view, it has been found feasible to set up a reserve of 10 cents per hour to meet the accrued liability problem in reference to cases of silicosis.

T. E. WATERS, of the Occupational Disease Commission, Baltimore, Maryland, discussed as the last feature of the program, the subject "Legislative Control and Compensation."

At the outset MR. WATERS emphasized that improper diagnosis is common.

History of the movement to make occupational disease compensable was traced from its early beginning and compensation legislation was distinguished from common law proceedings for damages. The various amendments to workmen's compensation laws were commented upon and described. It was pointed out that there is necessity for special provisions by law providing compensation for silicosis.

In discussing compensation for partial and total disability, especial emphasis was placed upon the necessity for medical authority regarding provisions denying compensation for partial disability. Compensation for total disability was discussed with reference to cases of silicosis accompanied by active pulmonary tuberculosis and cases of silicosis accompanied by other active pulmonary infections.

All laws make some provision for the problem of "accrued liability." Methods of treatment of this problem by state statutes in New York, Illinois, and Pennsylvania were described and compared.

The necessity for preemployment, periodic, and post-employment examinations, as well as autopsies, was stressed and medical authority for such examinations pointed out.

Creation of a medical board is both a necessary and difficult problem. Proper administration of occupational disease laws is impossible without provisions for some type of medical adjudication, either in the form of a board or some other similar body.

Finally, prevention and control measures are of significant importance—there is great necessity for legislative provisions for such measures and also definite arrangements should be made for appointment of personnel to administer such provisions of the laws.

Cancer

—As It Affects the Railway Employee and His Family—

F. WEBB GRIFFITH, M.D.,
Surgeon, Southern Railway; Member, Cancer Committee, Medical Society State of North Carolina

ON FIRST glance it would appear that a discussion of cancer is inappropriate in a meeting of Railway Surgeons.* I admit that it does not have the same obvious and direct relationship to the employee in the performance of his duties as do fractures, hernias, burns, etc., nor does the disability arising from it carry a monetary compensation. However a disease which ranks second as a cause of death, and which takes 150,000 lives annually in this country, is worthy of consideration at any medical meeting.

We may assume that every one of these deaths is a tragedy to at least four others. Therefore cancer strikes home to three-quarters of a million people in this country every year. If a war should cause that much agony in any one year, that would be bad enough; but remember that the ravages of cancer go on inexorably, year after year.

If there are 350 persons in this meeting today, according to the law of averages one of you should have a cancer tucked away somewhere in your body.

One-half of all fatalities from cancer are in the digestive tract. Therefore if you study carefully the malignancies arising between the lip and the anus you will learn a lot about the cause of death of one person in every 2,000 of the population in your vicinity.

Cancer of the breast and female genitalia comprise about 30% of the cancer mortality; or, to express it differently, for every 3,000 in your community, including men, women and children, one person will die each year from a cancer of the breast or female organs.

That would indicate that women are getting more than their share of cancer; and in the breasts and genitalia that is obviously true, but in the buccal cavity malignancy is six to eight times more frequent in men than in women.

Also vital statistics show that cancers of the stomach, gall-bladder, intestines and rectum are more frequent in men than in women.

In the past quarter of a century cancer has moved up from seventh to second place as the cause of death. That does not mean that there has been such a tremendous increase in the number of cancer deaths in proportion to the population, but it is due rather to more accurate vital statistics and to the marked reduction in the death rate of many of the other diseases. Be that as it may, cancer today stands as probably the greatest challenge to the medical profession.

One of the chief obstacles in the fight against cancer is the ingrained pessimism which exists both in the profession and among the laity. They take the attitude that if you have a cancer you are doomed—so what's the use?

Those of us who have passed the age of 50 remember that at the beginning of the century there was the same fatalistic attitude toward tuber-

* Abstract of a talk before the Association of Surgeons of the Southern Railway, at Jacksonville, Florida, June 9, 1937.

culosis. At that time a diagnosis of tuberculosis was usually a death sentence. The recognition of incipient tuberculosis was relatively rare. Today, with the exception of surgery in a very small percentage of cases, we know no more about the treatment of tuberculosis than was known 30 years ago, yet what a different picture we have. Recently, while celebrating life insurance week, a statement came from one of the large companies to the effect that in the past 20 years the mortality from tuberculosis between the ages of five and 35 had been reduced 75%.

That has been accomplished to a large extent by education.

I am not so optimistic as to believe that education can work such wonders in the fight against cancer, but thousands of lives could be saved or prolonged simply by using the knowledge we already have. I recall that when I was a medical student, Dr. Osler asked our class why it was that rose spots in typhoid were noted so infrequently by the practitioner, whereas the textbooks stated that they occurred in over 90% of the cases. After numerous guesses were made as to why they were so seldom seen in general practice, he replied: "It is because they are not looked for."

Cancer in its incipiency is frequently undetected for the same simple reason.

I will digress still further from strictly railway surgery, and discuss for a few minutes cancer of the uterus.

You will recall that the vaginal surface of the cervix is covered with many-layered squamous epithelium, which extends around to the external os. From the external os to the internal os there is a single layer of cylindrical epithelium, with racemose glands extending down into the cervix. At the internal os the epithelium changes from the columnar to the low cuboidal type, and these cells extend down into the underlying glands.

From these three types of epithelium arise three types of cancers to be found in the uterus:

1. The squamous-cell carcinoma arising from the squamous cells and usually starting close to the external os. These compose 85 to 90% of the cancers of the cervix.

2. The adeno- or cylindrical-cell carcinoma arising from the cylindrical cells of the inner lining or glands of the cervix.

3. The adeno-carcinoma of the body of the uterus arising from the cuboidal cells lining the body of the uterus or the underlying glands.

The most rapidly fatal of these three types is the adeno-carcinoma of the cervix. Fortunately it comprises only about 10 to 15% of the cancers of the cervix.

The next in rapidity of development is the squamous-cell cancer, which comprises about 85 to 90% of the cervical cancers.

The slowest growing and most favorable type is that arising from the cuboidal cells of the lining of the body of the uterus or underlying glands.

Unfortunately cancers of the cervix are at least 10 times more frequent than those of the body of the uterus.

Symptoms

FOR all practical purposes there are only two symptoms of early cancer of the cervix or fundus, and they are abnormal bleeding and abnormal discharge. Let's fix indelibly in our minds that pain and cachexia are not symptoms of early cancer; they are symptoms of late cancer and usually of approaching death. Any unusual bleeding or unusual discharge, especially the "spotting" following coitus or a douche, is a danger signal which should be investigated thoroughly.

We phone the fire department as soon as a blaze is discovered; the police are notified instantly when we suspect that a crime has been committed; but so often we procrastinate when a life is at stake.

Diagnosis

AS STATED previously, at least 85% of the cancers of the cervix arise at or external to the external os where they can be seen or felt. Be extremely suspicious of all so-called ulcerations or erosions, and of any cervix that bleeds easily on touch.

The cancer may manifest itself as a cauliflower projection into the vagina or as a nodule in the cervix, detected by sight or touch. Later on either of these two varieities may break down and form the so-called ulcerative type.

Now just a word about the Schiller test. The superficial layers of the epithelium covering the vagina and the vaginal portion of the cervix contain glycogen. When iodine in the form of Gram's or Lugol's solution (preferably Gram's) is applied, all of the visible portion of the cervix and vagina is changed to mahogany brown color. Other affections of the cervix will cause the epithelium to lose its glycogen, so that the involved area will remain uncolored. Remember, therefore, that this test shows merely disease of the cervix and indicates the area from which a specimen should be taken for examination, and is not of itself, pathognomonic of cancer.

Recently in a gynecological out-clinic the Schiller test was applied in 100 suspicious cases, and in 20 of these unstained areas were revealed, and two proved to be malignant.

Frequently it is necessary to remove several specimens from a cervix to prove or exclude cancer.

Thorough curettage is the only sure method of diagnosis in adeno-carcinoma of the cervix or corpus.

Treatment

SURGERY and radiotherapy (radium and x-ray) are the only accepted methods of treatment. For cancer of the cervix, radium is almost universally accepted as the better method. After thorough radiation, some surgeons prefer to do a simple panhysterectomy as an added safeguard.

Only a few operators still do the radical Wertheim panhysterectomy. On the other hand, surgery gives better results than does radiation in cancer of the body of the uterus in early or even moderately advanced stages. Pre-operative and postoperative x-ray treatment can do no harm, and may be of definite benefit.

I realize that I have told you absolutely nothing new; but if this brief summary has made you just a little more cancer-conscious, and more determined to utilize the many opportunities which we as railway surgeons have in the fight against the greatest of scourges, my purpose has been accomplished.

Injection Treatment of Hernia

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IN THE present article the injection treatment of oblique hernia will be discussed.* Direct, femoral, and umbilical hernia are excluded from consideration. In experience over a period of eight years with the injection method of treatment for hernia it is reasonable to exclude these other types as being unsuitable. As one specializing in general surgery, the limitations in the use of non-surgical means for the cure of hernia seem apparent. Experience with the injection treatment of indirect hernia in approximately 150 cases leads me to feel that there is a place for this type of treatment.

History

VELPEAU[1] was the first to attempt this procedure in 1837. In America, Pancoast[2] in 1844 described a method of treatment by injection of tincture of cantharides or of Lugol's solution into the sac. Schwalbe[3] suggested a 70% alcoholic solution, in 1877. Heaton[4] obtained results using the fluid extract of white oak bark. Mayer[5] in this country reported on 30 years' experience with zinc sulphate and phenol. More recently Hall,[6] Wolfe,[7] Crohn,[8] Rice,[9] Bratrud,[10] La Rochelle,[11] and others have reported their experiences.

Solutions

VARIOUS solutions such as iodine, tincture of cantharides, extract of white oak bark, phenol, and alcohol were advocated by the earlier writers. More recently investigators have used chemical irritants of a milder character, such as the tannic acid of botanical plants and flowers in alcoholic solution, extract of psyllium seed, oleic acid, oil of Thuja, and quinine urea. The writer has employed both the natural and the synthetic tannates in alcohol solution. Occasional allergic reactions have followed the use of both. Zinc sulphate and phenol solutions were found to be extremely irritating.

Experimental Work

TO DETERMINE what changes were produced in tissue by the injection of the solutions, rats were employed. The results of these experiments described in an earlier paper showed proliferation of connective tissue cells, fibroblasts, large mononuclear phagocytes together with foreign body giant cells. These results were confirmed later by the work of Rice, Bratrud, and Crohn.

A more recent study, using a synthetic tannic acid in 98% alcohol, showed rather dense small round cell infiltration and polymorphonuclear cells, thrombosis, and hyperemia. There was a marked fibroblastic proliferation. There were no foreign body giant cells. The addition of phenol 2% showed nothing to warrant its inclusion in the formula.

McKinney[12], using a solution of 50% phenol, 25% alcohol, and 25% oil of Thuja, was able to produce young fibrous connective tissue cells without necrosis, hemorrhage, or leukocytic infiltration.

Briefly stated, the injection of the irritating solutions will produce an inflammatory reaction. This reaction is accompanied by the production of new fibrous connective tissue cells which later form dense scar tissue.

The question is raised as to the injury incurred by the vas deferens as a result of the injection about the cord. In experimental studies on the dog, the writer has demonstrated the integrity of the cord. Six injections were made into the spermatic cord at the point where it leaves the external ring. Here the cord can be raised and the vas palpated. Thirty days later the cord and testes were removed and serial sections made. Dr. Oliver,[13] Pathologist at the Long Island College Hospital, reported on the pathology as follows: "To gross examination, the testicle, the vas deferens, and other tissue show no definite lesion. Microscopic examination of the section of the testes was normal. Serial sections through the vas deferens show it perfectly preserved. Its lumen is patent and the epithelial lining is intact. In the tissues surrounding the vas but exterior to its wall there is a mild subacute inflammatory reaction. There is considerable infiltration with leucocytes, principally mononuclear and some proliferation of fibrous connective tissue. A vessel in the inflamed area is filled with a recent thrombus which shows beginning organization."

A more recent study to determine the incidence of sterility following the injection treatment of hernia was made by Rea[14] at the University of Minnesota. Twenty-six male patients who had received from four to 28 injections for bilateral inguinal hernia were examined. He states that spermatozoa counts within the normal range were obtained. He concludes sterility would not therefore appear to be a complication of the injection treatment of hernia.

Rationale of the Injection Treatment

EMBRYOLOGICALLY, the testicle in its migration from the lumbar region into the scrotum is preceded by a portion of the peritoneum, the processus vaginalis, which normally becomes obliterated shortly before birth. Where obliteration of the funicular process is wholly or partially incomplete, various types of congenital inguinal hernia may develop. Chiene,[15] Russel,[16] Murray,[17] Turner,[18] and others have demonstrated that removal of the indirect sac alone will cure hernia in young adults. It is in this type of patient in whom obliteration of the funicular process has been interrupted that we may hope to have a successful cure of hernia with the injection treatment. Watson[19] observed that the obliteration of the processus vaginalis occurs at two points: first at the internal ring and a little later at a point just above the epididymus. Between these points, the processus vaginalis is an isolated tube which becomes smaller, its walls are occluded, and it finally terminates in a small, fibrous cord which is easily recognized during dissection or at operation.

In infants and young children a majority of small inguinal hernias will disappear with the application of a properly fitted truss. Coley[20] stated that over 50% are cured by this means. Ochsner[21] estimated the cures at 95%. There is no question that, in some apparent cures, the sac is only incompletely obliterated and this explains why a small percentage have a recurrence later in life.

Oblique hernia may be present without a fascial defect at the external ring greater than admits the tip of a finger. The muscle and fascia may show

* Read before the Association for the Advancement of Industrial Medicine and Surgery, New York City, May 19, 1937.

no evidence of atrophy or attenuation. In such cases, simple high ligation with or without removal of the sac will give a good percentage of cures. For the older patients with weak and atrophied musculature and large fascial defects, the canal must be repaired in addition and it is for this type that so many varieties of operation have been devised.

By the injection of a sterile chemical irritant we produce an asceptic local inflammation within and about the sac. The cellular response to inflammation binds the sac wall in an adhesive union which becomes firmly organized. The inguinal canal is closed by the same process and adds strength to the region. Injections are given once or twice weekly—depending on the solution and the reaction of the patient. After three or four injections, one finds the hernia no longer demonstrable.

Selection of Cases

SMALL reducible oblique hernia in the young person with strong tissues is the ideal type for treatment. Small recurrent direct hernias respond satisfactorily. Treatment is especially valuable in the large group of industrial workers who because of relaxed rings and a slight bulging in the inguinal canal are rejected by medical examiners.

Strangulated, incarcerated, and irreducible hernias should not be treated. Hernias which cannot be held reduced, likewise should not be injected. Sliding hernia, and hernia associated with undescended testicle, hemophilia and severe diabetes constitute other contra-indications.

Treatment

A PROPERLY fitted and applied truss is the initial step in treatment. My preference is the spring truss. It is easily adjusted to the patient and has less tendency to slip. The pad is fitted to the internal ring—and the patient advised to cough and strain his abdominal muscles. If the support is adequate, there is no protrusion of abdominal content.

Treatment is begun only after the patient has worn the truss with comfort for seven to 10 days and frequent inspections show that reduction is maintained.

Injections are made with the patient in a moderate Trendelenberg position. The region is shaved, the skin prepared with iodine, and the inguinal canal examined to ascertain whether or not its contents have been reduced. When aspiration shows entrance has not been made into a vessel, the solution is very slowly introduced. A few minutes later, the truss is applied and the patient may leave the table. One to 2 cc. of the solution is injected every five to seven days for 10 to 12 injections.

Complications and Sequelae

COMPLICATIONS during the course of treatment are infrequent. At times transient subjective sensations as of burning in the scrotum, penis, or anus are noted. They rarely last more than a few minutes. Occasionally there is a severe cramp-like pain about the umbilicus, non-radiating in character. This may last for about 30 minutes but apparently is not severe enough to incapacitate the patient. A systemic reaction following the use of synthetic tannic acid as evidenced by coryza and a slight malaise has been noted in a few instances. Swelling and induration of the cord appear after the first few injections. Occasionally the testicle may become sensitive. Tenderness and swelling respond rapidly to local applications of heat. Atrophy of the testicle has never been noted. Pressure of the truss may cause irritation of the skin. If skin irritation is present, injections are discontinued until healing takes place. While these conditions may be annoying, patients have been able to continue their routine duties.

Results

IN ORDER properly to evaluate results, patients should be under observation for two years after treatment. Because of the difficulties encountered in following up patients in a large city, this has been impossible at times.

Two hundred and fifty-two patients with hernia were examined between 1929 and 1931 and 69 cases only were selected as suitable for treatment. In this group of 69, there were 28 oblique hernias on the right side and 21 on the left. Eleven cases presented bilateral hernia. Nine patients had submitted to one or more surgical repairs with subsequent recurrence. Four patients discontinued treatment after a few injections, making the total number treated 65. Fifty-five patients were observed over a period of eight years. Thirty-eight patients examined two years after treatment showed no recurrence. Seventeen additional patients were examined four to eight years later. No recurrence was noted. Fifty-five patients cured of a total of 65 treated gives a favorable result in 84%.

Failures

FOUR cases in whom this treatment was unsuccessful were operated upon.

I. R.—an obese individual, over 200 lbs., received 12 injections. He had great difficulty wearing his truss and discarded it at his pleasure. The result was unsatisfactory and he submitted to an operation.

J. L.—age 34, presented a large oblique scrotal hernia of eight years' duration. He received 10 injections of a 2% tannic acid solution in alcohol, and six months later he noted a bulging at the external ring. He was injected 15 times with zinc chloride urea glucose solutions and was symptom free for 24 months, when he developed pain in the right side. He was subjected to operation and the surgeon stated that he found no evidence of an oblique sac but that a direct defect was present through which a diverticulum of the bladder had prolapsed. He made an uneventful recovery.

S. V.—age 54, obese, presented an oblique hernia with a defect in the floor of the canal. Ten injections were given. Patient developed bronchitis with severe racking cough. Hernia recurred and he was operated upon. The sac and inguinal canal were involved in a mass of dense adhesions. There was a large defect in the floor of the canal.

I. S.—nurse, age 58, indirect hernia, had 18 injections with no result. She was operated upon.

Four patients died of intercurrent disease;

One of encephalitis 18 months after injections;

One of heart disease two years after injections.

R. P.—age 54, received nine injections the first two months of 1931. He died of general peritonitis in April, 1932. Postmortem examination showed perforated carcinoma of the stomach. The pathologist was unable to pass a probe through the in-

ternal ring into a pre-existent hernial sac. Gross examination of testicle, negative.

W. S.—age 62, died of carcinoma of larynx. Bilateral hernia treated 37 years ago by injection. Well until recurrence nine years ago, 27 years after treatment. Received nine injections on right side and six on left. Died two years later of carcinoma of larynx.

Summary

WHILE the results presented may be insufficient for a statistical analysis, it has been demonstrated that oblique hernias may be cured by means other than surgery. The hazards are no greater than those of surgery. It is my opinion that its greatest field lies in the cure of the recent oblique hernia appearing in young adults with good muscular tone and no large fascial defect, precisely the type which gives surgery the greatest percentage of cure. It is especially valuable in that group of workers who have been rejected by medical examiners because of a potential hernia. Although they present a relaxation of the rings without a definite impulse, they are subjected to operation with its consequent trauma to the tissues of the inguinal canal. Here injection treatment would give its maximum result with minimum trauma.

The injection treatment has the following advantages:

1. Patients need not be hospitalized, and
2. Their industrial activities are uninterrupted.

Further study of tissue reaction to various chemicals may in the future uncover some drug which will produce an overabundance of fibroblastic tissue with firm adhesive power and little tendency to resorption.

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Malingering

—*After Eye Injuries*—

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AMONG all the great industrial corporations it seems to me that the railroads have been the preferred victims of damage suits for pretended injuries, and among the many malingerers that come into court those claiming damage to eyesight are by no means the least numerous.*

Most of the eye injuries connected with our railroads, however, occur among our trainmen and shopworkers, eye accidents to travellers having become few and far between; and we are constantly being called upon to estimate the amount of damage resulting from a real or alleged injury —especially by the insurance companies and the state industrial corporation commissions.

In all these cases I feel that we should try to approach them with an open and unprejudiced mind, remembering that often we are judge and jury in the case—our whole aim being to find out the real truth in what is often a difficult matter to decide.

The supposed malingerer is practically always a referred case. You are all only too familiar with the story. An accident has occurred—an eye is more or less injured. The patient under competent care is doing well, and would perhaps soon be able to return to work. Some disgruntled friend or a second-class lawyer gets hold of him. A damage suit is suggested, and at once the gravity of the case begins to increase.

They come to us with all manner of claims, varying from complete blindness to persistent conjunctivitis, monocular blindness, partial loss of visual acuity in one or both eyes, contraction of fields, asthenopia, persistently dilated pupils, lid injury, etc.

In studying these cases, the man himself is our first subject of inquiry. Remember that a malingerer is an actor, one who is feigning a part, and no matter how clever he may be, in some way or another, often in the most unexpected way, he will betray himself. He knows that he is trying to act out a falsehood and suspects, if he does not know, that he has been sent to you to see if you can detect it. He comes suspicious of everything, and by his very attitude we have often been perfectly satisfied that a man is malingering before examining the eyes or ears at all. The big dark glasses, the bandage on an eye that does not need it, the extreme photophobia when we try to look at the eye, all put us on our guard.

* Read before the Association of Surgeons of the Southern Railway, Jacksonville, Florida, June 8, 1937.

IN MAKING our examination, it is usually, not always, best to be alone with him. (I say "him" because I have never seen one of the other sex, and have heard of only one.) Do all you can to put him at ease. Get his past history, his family record. What work has he been doing? When did the accident occur? What was he doing? Was anyone else present? Had the eyes ever been examined before the accident? Can any previous record of vision be found? (This is often invaluable and may settle the question at once.)

E.G., (A 9, 49 Lab.), came into our office in May last complaining of injury to left eye while working in a quarry; no injury could be found. Vision of injured (?) eye 20/40— : 20/20 w plus 1, while vision of right and uninjured eye was only fingers at six feet.

The following August he came again, saying that right eye had been hurt by flying slate, and that his vision was badly impaired. Examination by my partner showed no objective trouble. He went home and appeared at the University Clinic a few days later. His right eye was then considerably injected, and one of our interns removed a small scale of slate from under the upper lid. He complained bitterly of failing vision, charging that Dr. Woodward's failure to remove the slate at the first visit was the cause of the trouble.

When this patient was seen again by the writer a week or two later, the right eye showed no signs of injury, but he was in an ugly mood, threatening suit, etc. Vision of left eye as before, 20/20 — w plus 1. In the right he would acknowledge but little. When, however, he was confronted with his written history given in the preceding May, showing that vision was very poor long before the supposed injury, the threatened suit was dropped at once.

This but emphasizes the fact we all appreciate, that every person entering the employ of any company should have a complete physical examination on entry. But even in this we may find trouble. Three years ago a man came to us for the triennial railroad examination for sight and hearing. He passed as all right. Not long afterward his brother came for the same. He, too, passed without trouble. At the next triennial examination, the same two men passed again, one a few days after the other. Shortly after this the Railroad attorney came to our office with the two brothers, dressed just alike, twins, so similar I doubt if their own father could tell them apart. But one had a complete cataract in his right eye, and his brother had been standing his examinations for him! The result was that both men were dropped from the railroad force.

MAKE a searching objective examination of both eyes, using cycloplegia if needed, and satisfy yourself as far as possible whether your findings do or do not correspond with the subjective *claims*. Cases of feigned total loss of vision are few. I have never seen one in civil life.

During the war, in one of the Government hospitals, there was a young "blind" woman who had become quite a local celebrity because of the remarkable things which she could do in spite of her "blindness". A friend of mine who took charge of the hospital soon became convinced that she was malingering, and told her that she would have to get out. So, like the unjust steward, she prepared to make friends of the mammon of unrighteousness. She called for her Christian Science friends. A prayer seance was held, and suddenly she jumped up exclaiming "Oh—I can see, I can see."

Cases due to trauma must be rare. Some poisoning cases might give us trouble, but usually careful observation will reveal the truth, for the whole bearing and attitude of the really blind is so characteristic that the best of actors cannot long keep up the pretense.

Direct and consensual pupil reaction will show us that the visual tracts are functioning as far back as the primary ganglia, but does not exclude lesions between these points and the visual centers.

If when facing a spot light the eye turns in under prism base out, of course the case is settled.

As to feigned monocular blindness, if our malingerers only knew how much more difficult it is to unmask a claim of partial rather than total loss of vision in one eye, we would not have so many of the latter. And just here we must remember that our so-called malingerer may be perfectly honest in attributing the loss of vision in one eye to an injury that had nothing whatever to do with it. We well know that a man may be highly amblyopic, or even totally blind in one eye and be perfectly unconscious of it. A trivial injury calls his attention to it (mud splattering). He finds he cannot see, and very naturally attributes the loss of vision to the recent occurrence. We know, too, that many amblyopic eyes show no objective pathological changes, and we must always be on our guard against imputing falsehood in a case which claims to be blind because we cannot see any reason why he cannot see. These facts emphasize the extreme importance of a record of distant vision at least of every man taken into the employ of a corporation, and of making a record of vision of all cases that come to our offices and clinics for even trivial matters. A record that does not take five minutes to make may be worth thousands of dollars in a damage suit later on.

Others come knowing that the vision of the injured eye was poor before the injury, and attributing all the loss of sight to the latter; and some have gone so far as deliberately to slash an already bad eye during the course of an accident to collect damages for its loss.

The unmasking of an unsophisticated malingerer claiming blindness in one eye is usually easy: probably our objective examination has shown little, if any, pathology. Focal illumination has given us direct and consensual contraction of the pupils, unless the blind eye is atropinized, and even then we get the consensual contraction.

Our next step is to demonstrate that he can *see light*. Seated before the test card, apparently pay all your attention to the good eye. Get its vision accurately, refract carefully if need be, test for colors and accommodation. In short, get him to think that you are working entirely with the good eye. Do not pay any attention to the other.

Now a little prism, suggested in the *Journal of Ophthamology* by a man in St. Paul, (whose name I forget), has been invaluable to me. It is simply a one-inch by three-inch bit of plain glass, the upper half of which is cut to a 6° prism, the base line dividing the plate horizontally.

When you begin your subjective examination, you have all seen the old malingerer close the

"bad" eye to be sure to know how to answer. Unfortunately, a quick wink will not serve his purpose. He must hold it closed so long that a watchful observer will see him do it. The whole success of this test lies in thoroughly convincing him that he can see two images with one eye.

Before making the test, it is well by the parallax test to see if there is any eso- or exo-phoria; and if any be found, correct by prism on the "bad" eye. Use a small, fairly bright light at 20 feet. I prefer monochromatic light to avoid chromatic aberration. Cover the blind eye. Try several colors in succession as if testing for colors. Now place the plate in such a position that the *base* of the prism cuts the middle of the pupil of the good eye, base horizontal, of course. Be careful not to cover the whole pupil. Now uncover the blind eye. The image of this eye will fuse with the lower of the images seen by the "good" eye, and there is no appreciable difference whether he looks with both eyes, or the good eye only. Now cover the pupil completely by slightly and slowly lowering the prism, and, if he still sees two lights, of course he is seeing the lower light with the "blind" eye.

Unless there is marked heterophoria, (and if there is we are supposed to have corrected for it), the average intelligent person will have difficulty in telling when the prism edge cuts the pupil of the "good" eye, and when the prism completely covers it.

Indeed, in these tests the very demonstration of heterophoria practially demonstrates binocular vision.

Convergence under a 6° prism, base out, will demonstrate the same thing.

I BELIEVE it a mistake to try too many tests. The bar between the eyes and the printed page while the patient reads aloud is a good one if it is used carefully and casually, as if to point out something. This is useless, of course, for illiterates.

If you have a test frame in which you can easily rotate a clinder without the patient's notice, the Jackson cross-cylinder test is good.

The plus 10 before the good eye and the plus 12 before the "blind" eye is almost too transparent for any but a beginner.

Suellens Red-Green types are good, if used before he learns to close the blind eye.

Getting a signature with a red pencil on white paper with red glass over the "good" eye can often be used to advantage, and can often be run in casually while apparently testing the "good" eye only.

Again, reading along at six inches with plus six in the "good" eye and his own correction, if needed, in the "blind" eye, then gradually move the type away. Beyond eight inches the reading must be done with the "blind" eye.

Almost any of these tests will unmask the novice. Unfortunately the old hand knows them just as well as we do, perhaps better, but I have never yet had one who failed to get into trouble with the Worth amblyoscope.

In front of each of the cells holding the little celluloid pictures is an additional cell with a false bottom, and a little spring-catch so arranged that when it is pressed the picture quietly disappears.

Have two colored pictures just alike. Assume the left eye is supposed to be blind. While he is not looking, put one picture in the left cell and cross the tubes. Then, while he watches you, put the other picture into the false-bottomed cell on the right side. Turn it to the window and take a good look yourself, and as you turn to hand it to the patient touch the spring and the right picture (i.e., the picture which the right eye would have seen) disappears. Now ask him, not whether or not he sees the bird—assume that he does—but what color it is. He saw you put the bird into the right side. When he looks, he *sees* the bird on the right side, though seeing with the left eye, and the chances are that he will tell you what kind of bird it is.

Again, tubes in normal position; left eye "blind"; bird in left cell, with block in left false cell; cage with perch in right cell. Let him look at it. You may see him slyly close the left eye, but everything is dark and he is satisfied and says he sees the cage. Now slip a transparent slide with bird into the false cell of the right side, and let him look at it. Ask him if the bird is sitting on the perch. It is probably not. Take the instrument and trip both springs. You can easily do it when he does not notice it. The block disappears from the left bird, and the transparent bird from before the cage in the right side. Now take the vertical adjusting screw and try yourself to get the bird to sit on the perch. When you succeed, hand it to him, calling his attention to the vertical adjustment. So far I have found no one who did not try diligently to seat the bird.

An attempt to follow you rapidly up or down stairs with a 4° prism base up and down may be disastrous. A safer test is to let him read aloud with 2° prism base up and down before one eye, and then quickly rotate one prism. The resulting diplopia makes binocular reading practically impossible.

PATIENTS claiming reduced vision with one or both eyes are far more difficult to handle, for, by objective examination, it is often hard to accurately estimate visual acuity. We see many eyes that look as if the vision must be very poor and yet which see remarkably well, while others with apparently insignificant injuries have badly impaired vision. This is especially true of small lesions about the macula. Yet in the average case we can make a fair estimate of what he ought to see, and if the objective findings and subjective tests are much at variance we shall at least suspect malingering.

The careful use of mirrors will often bring out the truth. He thinks the letters in the mirror at 10 feet are closer than those on the wall at 20, and so will read further. Careful watching while the patient is unaware will often settle the matter.

One who claims partial loss of field will usually admit a larger angle at close range than further off, and an object quickly flashed before the "blind" part of the field will often make him flinch.

We find cases in which the duration of convalescence from an injury is deliberately increased by artificial irritation, or we even find an eye deliberately injured. Self-inflicted injuries are, however, rarely severe unless the eye was already poor. Artificial conjuctivitis from irritants is practically always confined to the lower lid. If in doubt, cleanse the eye and bandage. If an infectious type,

the eye will be worse the next day. If due to irritants deliberately put in, it will be better.

Cases of pretended mydriasis from a blow must be kept under watch in a hospital long enough for the effects of a mydriatic to wear off; but we must not forget that cases of mydriasis occur whose cause is hard to find.

Cases of severe deliberate injury to blind eyes are on record.

Hysterical amblyopias will show the field reversals and the general stigmata of hysteria.

We occasionally find deception practised with exactly the opposite end in view—i.e., to try to show a visual acuity greater than really exists.

Of course, memorizing the test charts is an old dodge, and one that is easily detected.

As I have told you, a pair of twins once gave us trouble. We made the usual triennial examination for one of them, and a week or so afterward for his brother. Both passed without trouble. Three years later we did the same. Shortly after this, one of the officials of the road came in with the two men. One had two good eyes, the other a mature cataract in one eye. The men were dressed alike, and I have been told that their wives had met them at the train and started home with the wrong one. The man with the two good eyes had stood the examinations for both. Both were dismissed from service.

Lastly, I must tell the story of attempted malingering on the side of the railroad, one of whose engineers had run by a red light and caused a wreck.

Opposing counsel held that the man was color blind, and that the accident was due to negligence of the road in keeping him on the engine, when they should have known he was color blind. The case came up for test in court. The engineer called all colors correctly till an official of the road who was looking on was removed from the room. To save the company, he and the engineer had arranged a set of finger signals for the colors, and as long as he could see the colors and the engineer could see him, all was well for the railroad.

Sodium Hexametaphosphate

— Its Use for Certain Occupational Dermatoses —

K. K. JONES, PH.D., D. E. MURRAY, M.S.,
A. C. IVY, PH.D., M.D*.

OF ALL the varied list of substances[1] that produce an eczematoid dermatosis under industrial conditions, soap, oil, and related substances are the most common, and the conditions they cause are among the most difficult to treat.[2] Soap dermatitis is not only met with in the factories where it is manufactured and packaged, but is also found in the scouring and cleansing operations incidental to the manufacture of a wide range of goods.[3] Also, in many occupations, the continual use of strong cleansers on the hands, face, and body, give rise to severe skin disturbances.

Soap owes much of its harmful effect to the alkali which it contains. Even though the soap be of the neutral or super fatted type, it dissociates in solution to form free alkali. Soap, as a chemical compound, is only stable at a pH around 11 and at a point such as this, alkaline solutions rapidly attack skin bringing about absorption of water and hydrolysis of the proteins.[4]

Outside of alkaline compounds, strong oxidizing, reducing, or dehydrating agents, very few substances are able to attack the intact epidermis. Oil soluble compounds, on the other hand, can dissolve in the sebaceous secretion and, in so doing, enter the duct of the hair follicles, where they can be taken up by the cells of the sebaceous gland and find entrance to the basal layer cells and the capillaries of the circulatory system.[5]

This impervious nature of the intact epidermis appears to be due to its high content of cholesterol and cholesterol esters, and the low content of fatty acids, a condition that is reversed in the case of the sebaceous glands.[6]

While most of the irritant action of soap is due to its alkaline nature the fatty acids in themselves may produce a reaction in the skin, especially the fatty acids of cocoanut oil, cotton seed oil, and many other oils.[7]

Along with the vegetable oils and fatty acids, mineral oils may also be taken up by the sebaceous glands, but in this case the oil cannot be metabolized by the body as the fatty acids can. Chemically pure paraffin is inert when in contact with the cells of the body, but the impure paraffin oils contain compounds that are strongly irritant to the cells. Some of these compounds have recently been proved carcinogentic.[8] The almost unlimited use of such oils as lubricants, cutting oils, and softeners in the processing of manufactured products, gives rise to a condition of oil acne as a common complaint.[9]

OUR attention was called to these problems by skin disorders appearing among employees of plants where these employees were exposed to soap and oil continually during the day's work.

The dry soap powder was not particularly irritating on the dry surface of the body. On the moist surfaces, such as the conjunctiva of the eye, or the mucosa of the nose, it was very irritating and produced sneezing and tears. Dry soap, according to Welwart,[10] has practically no free alkali and very little action on the skin, but dissolved in the moisture of the perspiration it immediately dissociates, with the formation of free alkali and the resulting irritation. There is much evidence that soap and alkali on the skin induce an increased flow of perspiration.[11]

The problem, in our case, was to protect the body against the injurious action of the soap, since it was impossible to avoid the use of soap and frequent washings only served to irritate the skin further. It was necessary to find means to accomplish three ends, if possible, namely:

1. To reduce the perspiration.
2. To decrease the sebaceous secretion.
3. To remove, or render innocuous, and neutralize the alkalinity that occurs on the skin despite other precautions.

Koenig's[12] use of sodium hexametaphosphate in the successful treatment of diaper rash in infants suggested a rational treatment for this condition, since these infants suffered chiefly from an alkaline dermatitis. This sodium hexametaphosphate used by Koenig is the salt of one of the polymers

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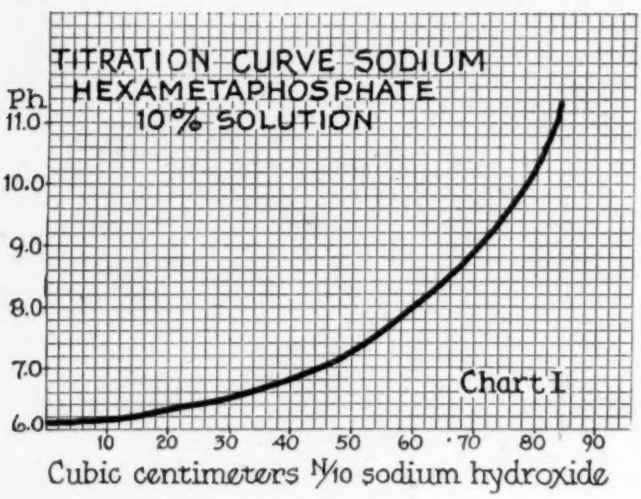
of metaphosphoric acid which has the interesting property of forming a soluble nonionized complex with the alkaline earth metals, such as calcium and magnesium. Hence, it is an excellent water softener.[13] In solution this salt has a pH of 6 and can buffer the skin at this acidity against a large amount of alkali. Since preliminary trials had shown a marked effect of this compound toward reducing perspiration, and quieting irritation, it seemed well adapted to the treatment of this soap dermatitis.



EXPERIMENTAL:

A. *The buffering action of sodium hexametaphosphate against alkali.*

A 10% solution of the sodium hexametaphosphate was titrated against N/10 sodium hydroxide. The results are shown in the accompanying graph. (Chart 1).

In this it is shown that it takes 82 cc. of N/10 sodium hydroxide to bring 100 cc. of a 10% solution of sodium hexametaphosphate to a pH of 11.4. Hence this compound has the properties of an acid salt.

B. *The effect of sodium hexametaphosphate on the loss of water by the skin.*

This effect of sodium hexametaphosphate on the invisible perspiration was measured by a method recently published by the writers,[14] in which the moisture, from a given area of skin, was removed by means of a current of dry air. On passage through weighed sulphuric acid tubes, the moisture was taken from the air, and weighed at suitable intervals.

It was found in numerous control determinations, that approximately one hour was necessary before the rate of excretion of the water from the skin becomes constant. There is a rapid drop during the first half hour due to the removal of moisture accumulated on the surface of the skin. After this is removed, moisture is usually given off at a uniform rate for at least four hours, if the temperature is below that which produces active sweating. Therefore, it is necessary that the room be held constant at some temperature around 25° C. In these tests, the sodium hexametaphosphate was applied to the skin both as a finely divided powder and as a 10% solution. In the first case the readings could be taken directly but in the second case only after the water of the solution had been removed. The results are shown in Charts II and III. Chart II shows the effect of the dry powdered hexametaphosphate. The figures are plotted from the average of six different individuals for the five-hour period. Chart III shows the effect of using a solution instead of the dry powder. From these curves it is seen that the excretion of water became constant around 58 mg. for 30 minutes from the skin area used of 50 sq. cm. After the application of the dry hexametaphosphate, the moisture excreted for each 30-minute period fell to nearly 10 mg. and then rose to a level of 25 mg. which was held constant for several hours before rising slowly to the normal figure. In the case of the liquid solution of the metaphosphate, the moisture necessarily had to be removed before the lower level of excretion was reached.

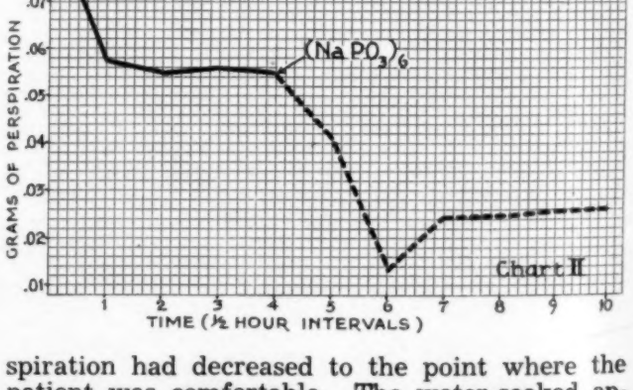
CLINICAL:

A. *Hyperidrosis.*

On the basis of these results the sodium hexametaphosphate was next tried on 30 cases of uncomplicated hyperidrosis. These were found among the factory workers, especially those that had to be on their feet much of the time. The sweating of these individuals was therefore almost wholly localized to the feet. Beside the sweating the patient complained of burning sensations, tenderness, and even pain. On examination, the maceration of the tissues was found severe enough in most cases to be definitely disabling. Tricophytid infestation was ruled out by the examination of frequent potassium hydroxide slides made on each patient.

For treatment each patient was instructed to wash his feet night and morning with a tincture of green soap followed by a careful rinsing in a 1-2% solution of the sodium hexametaphosphate. The patient was further instructed to use cotton socks, to change them daily, and to dust a thin film of the powdered compound into the shoes each morning.

By the end of the second day the excessive perspiration had decreased to the point where the patient was comfortable. The water-soaked appearance of the skin was improved and the skin appeared dry. After one week, so far as could be told, the skin was normal. It was continued in this condition by maintaining cleanliness and the use of the powdered compound. When, however, boric acid was substituted for the powdered hexametaphosphate without the patient's knowledge, in one week the hyperidrosis returned. The resumption of the metaphosphate therapy again relieved the symptoms.

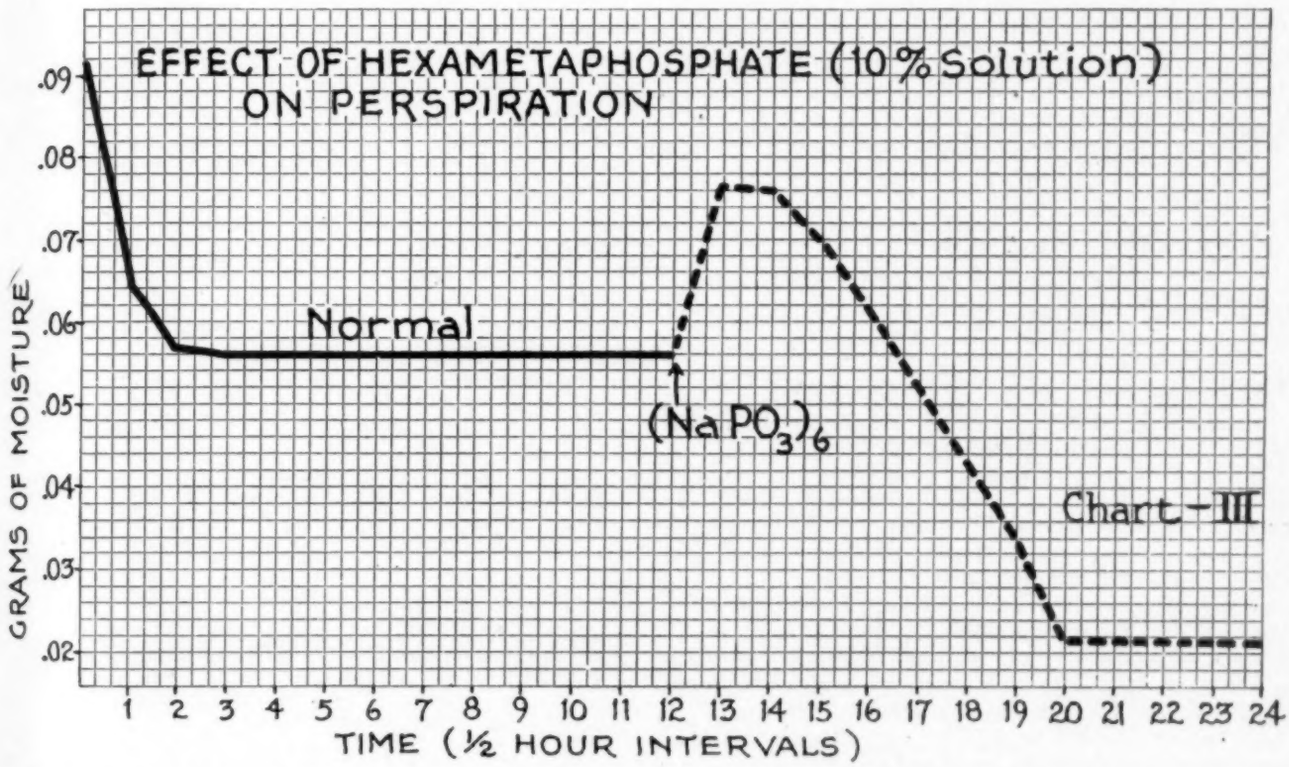


B. *Tricophytid Infestations.*

So successful was the use of sodium hexametaphosphate in cases of excessive perspiration that it seemed desirable to try the same treatment on cases of acute lesions due to the tricophytid infestation with its raw weeping surfaces. Used in the same way as for the uncomplicated cases of sweating, an immediate drying effect was observed in all cases and particularly relief from the intense itching. In all cases relief was obtained but clinical cures could not be effected except in very mild conditions. For this purpose treatment with keratolytic agents such as salicylic acid and cresophan were required to remove the scales that covered the fungus. When, however, the organism was killed, the use of the metaphosphate protected the raw surface and prevented reinfestation by keeping the surface dry and firm.

C. *Soap Dermatitis.*

From this experience with sodium hexametaphosphate, it seemed reasonable that this compound would be effective in treating the dermatitis prevalent in the factory. Twenty-five cases were selected among those presented as having a definite history of uncomplicated dermatitis originating from one to five months after starting work in the factory.



The disorder was characterized by smarting and burning, followed by the appearance of a brilliant erythema having distinct edges limited to exposed areas, primarily to the hands and arms. The erythema was followed by discrete pinhead-sized vesicles which persisted, increasing in number but not coalescing. Once these lesions occurred, the patient had them continuously as long as he worked. Exudation was noticed only at the beginning but the lesions remained moist. The only remissions were seen at the time of the annual vacation, when the condition would clear, provided the vacation was long enough.

Treatment was started as follows:

The affected areas were bathed four times daily with a 1% solution of the hexametaphosphate; in the morning, before going to work, in the noon hour, immediately at the close of the working day, and just before going to bed. The patient was instructed to use no soap and to be especially careful in regard to the noon and evening washings.

A favorable result from this simple treatment was usually noticed very promptly. Within two hours following the first treatment, a marked alleviation of the subjective symptoms was reported. Within 72 hours, a diminution of the erythema and the vesiculation could be noticed. In one to two weeks the ordinarily severe cases were completely cured, while a few stubborn chronic cases required a month.

Following what was deemed a clinical cure, all treatment was stopped in 15 of the patients. The remaining 10 were told to continue the treatment although not as rigorously as before. Of the 15 who discontinued treatment, all showed recurrences while none of the 10 who continued using the metaphosphate showed any return of the symptoms. No effect was noted on the skin other than the increased dryness. The dermatitis of employees new to the work was more severe than that of the older employees.

D. *Oil Acne.*

Where crude petroleum preparations were used in the process of manufacturing, the workers would get the oil on their hands, arms, and the anterior aspect of the thighs. These workers developed skin lesions described by Hamilton.[15] The crude oil enters the follicles and causes an irritation of the epithelial cells of the follicle.

Forty patients who had previously been treated with calamine lotion, ammoniated mercury, boric acid, and alcohol, with no improvements, were placed upon a therapeutic regime. The treatment given these workers was the same as that given in the case of soap dermatitis.

The first effect of this treatment to be observed was a definite decrease in the erythema and itching. In patients who had but recently become

afflicted with this trouble and in whom the pustules were relatively few in number, a week was required before much further improvement was observed. Then, however, the improvement was rapid. The pustules dried and disappeared. In cases of long duration this treatment required more time, and in some cases other forms of medication gave better results. In all cases, either acute or chronic, the distressing symptoms of erythema, itching, and burning, were relieved.

When used as a prophylactic or an abortive treatment for oil acne, the 1% solution of sodium hexametaphosphate proved to be as effective as daily washings with boric acid and alcohol and more effective than either boric acid or alcohol used alone. In these cases, as in those of soap dermatitis, the marked alleviation of subjective symptoms was such that the patients returned for more of the metaphosphate in preference to other forms of treatment. This seems worthy of emphasis, since it contributed markedly to the success of the treatment, as these patients were ambulatory and treated themselves in their homes. Such patients are faithful to any regime only as long as they receive consistent relief from their symptoms.

Discussion

SODIUM hexametaphosphate is not bactericidal and does not injure living cells. Under a solution of the metaphosphate strong enough to be decidedly bacteriostatic, body cells can grow. Later experiments have shown that even stronger solutions may be used than 1% or 2% with benefit. There is no penetration of the epidermis to injure the basal cells but there is a definite improvement of the cementing together of the cornified layer into a more impermeable coating. This shown in the case of the tricophytid lesions where a keratolytic agent is required to remove the outer scales before the organism could be reached.

When alkaline solutions are placed on the skin they cause a rapid softening of the cornified layer and a definite dermatitis. The metaphosphate leaves a film on the skin that can neutralize this alkalinity and prevent the irritation.

Conclusion

SODIUM hexametaphosphate acts on the skin to form a protective coating, acid in nature, that inhibits the action of alkali on the skin.

2. Sodium hexametaphosphate either as a dry powder or as a solution will reduce the excretion of invisible perspiration by 50%.

3. The protectvie film of sodium hexametaphosphate on the skin removes the irritation of soap and oil and acts as a prophylactic and cure for this condition.

4. The protective film formed by the hexametaphosphate is useful in the treatment of patients having hyperidrosis and tricophytid infestations.

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Dermatitis from "Zotos"

LOUIS TULIPAN, M.D.,
New York City

THIS is the report of a case of dermatitis caused by Zotos, a machineless permanent wave preparation. The patient has been a hairdresser for 10 years, but he has used Zotos only for the last three years.

The Zotos method uses a pad consisting of a piece of white flannel impregnated with a powder, and covered by a sheet of perforated tin foil on the outer surface. The procedure consists in blocking off strands of hair with clamps made of wood, rubber and asbestos. The hair of the scalp is thus separated into from 24 to 32 strands, and the purpose is to prevent any solution from wetting the scalp. The next step is the application of a solution called "Zotion" the purpose of which is to soften the hair. This is followed by winding the hair on aluminum rods. The Zotos pads are dipped into cold water, excess water is pressed out, and the pads are then placed on each strand of hair and allowed to remain there for 15 to 30 minutes until the pads are cold. The hair is then rinsed with water and set.

The agency in this method used to bring about the "set" is heat produced by a chemical reaction as opposed to the older electric heat curler method. In both, the agent is heat applied to moistened hair. The content of the Zotos pad is a trade secret so that it has been impossible to obtain the nature of its chemical constituents directly. A report from the A.M.A. stated that their chemists, from cursory tests of a sample of "Zotion" solution sent to them by a woman who had used the preparation with unpleasant results, reported that Zotos solution seemed to be a strong mixture of ammonia and either pine or pine needle oil. From its production of heat on addition of water, Zotos resembles the reaction of calcium oxide and water with production of heat and calcium hydroxide (slaking of lime).

J. S., a white male, aged 35, came to me on March 11, 1937, and gave a history of having done hair waving for the past 10 years without any trouble. He had used the Zotos preparations for the past three years. In January, 1937, he first noticed itching and tiny blisters on the left ring finger which soon spread to the rest of both hands. On examination he presented a profuse eruption of pinhead vesicles on an erythematous base involving all surfaces of most of the fingers, the dorsa of both hands and both wrists. The skin elsewhere was free of any lesions.

Patch tests with peroxide soap solutions and waving solutions used by the patient were nega-

tive. He gave a strongly positive test with a weak solution of the Zotos pads (the heating agent).

Stopping work, soothing lotions and salves and six fractional x-ray treatment (25"%o E.D.) cleared up the eruption in a few weeks. The patient then returned to work and refrained from contact with Zotos pads until the latter part of May. An acute vesicular dermatitis appeared on his hands the following day. He was again seen on June 14, with an eruption similar to that of his first attack. Under the same soothing treatment, the eruption was cured in a few weeks.

Conclusion: This is the report of a case of dermatitis due to "Zotos", a recent "machineless" permanent wave method, in which patch tests were negative for all preparations used except the Zotos heating pads.

New York Central Surgeons

THE Fourteenth Annual Meeting of the Association of Surgeons of the New York Central System will be held at the Hotel Cleveland, Cleveland, Ohio, on Monday, Tuesday and Wednesday, September 13, 14 and 15, 1937.

An attractive and interesting program has been arranged for this meeting. The clinical programs at Lakeside and Cleveland Clinic Hospitals will be very much worth while, and the program of 10-minute papers by the members, which is something new, should prove a feature of outstanding interest.

This is again a three-day meeting, the first day being given over to the golf tournament, an acquaintance-tea for the ladies in the afternoon, and an informal reception to the President of the Association in the evening. This plan was first tried at Detroit last year and proved successful, more than 150 of the members and their ladies being present at the reception.

The ladies' entertainment program has been unusually well planned by the local Ladies' Committee. There will be the complimentary bridge-luncheon on Tuesday, which all ladies should attend, including those who do not care to play bridge, and who will be otherwise entertained. No entertainment is scheduled for Wednesday, this day having purposely been left free so that the ladies may shop or attend the Great Lakes Exposition being held at Cleveland, which has been extended to September 26.

The annual complimentary dinner for the attending surgeons and their wives will be held in the Ballroom on the mezzanine floor of the hotel on Tuesday evening. This year there will be more time allowed for entertainment and dancing. Arrangements have also been made for those who care to play bridge following the dinner.

The Registration and Information Bureau will be open on Monday morning on the mezzanine floor adjacent to the Ballroom in which the meetings will be held. All members are urged to register immediately on arrival. At that time they should obtain tickets for the bridge-luncheon and for the annual dinner. Visiting ladies will be received on Monday morning in the Red Room on the mezzanine floor. Headquarters for the ladies will be established in this room and maintained during the convention.

The Association expresses its appreciation of the splendid program arranged by the local committee under the direction of Dr. H. D. Fowler; and its debt to Dr. Charles F. Nelson, Chairman of the Oculists' Program Committee, and to the Ladies' Committee, which, under the direction of Mrs. Charles F. Nelson, has given a great deal of time and thought to the entertainment of the ladies who will attend this meeting.

Following is the complete program:

Monday, September 13

9:00 A.M.—Registration and Information Bureau, Mezzanine floor.
All-day Golf Tournament, Shaker Heights Country Club (Must tee off by 3:00 P.M.).

2:00 P.M.—Ladies' Acquaintance Tea, Rose Room in main lobby.

8:30 P.M.—Informal Reception to the President of the Association, Dr. George P. Myers, in the Ballroom on the Mezzanine floor (including dancing and refreshments).

Tuesday, September 14, Scientific Session:

8:30 A.M.—Registration continued at Registration Desk on Mezzanine floor.

9:30 A.M.—General Meeting, Convention Hall — Ballroom on the Mezzanine floor.

1. President's Address: Dr. George P. Myers, Medical Director, New York Central System, Detroit, Michigan.
2. "Disabilities about the Shoulder Joint"—Dr. Wallace S. Duncan, Cleveland, Ohio.
3. "Hernia, Inguinal and Femoral: an 'Autologous' Fascia Suture Technique" — Dr. Robert C. Austin, Dayton, Ohio (Illustrated by motion pictures).
4. "Hypertension and Coronary Disease" — Dr. R. W. Scott, Cleveland, Ohio (Illustrated by lantern slides).
5. "The Railroad Surgeon's Relation to Occupational Diseases"—Mr. O. G. Browne, Assistant General Claims Attorney, New York Central System, New York City.

12:30 P.M.—Oculists' Luncheon and Meeting, Rooms 1 and 3 on the Mezzanine floor.

1. "The Management of Intra-Ocular Foreign Bodies"—Dr. William H. Evans, Youngstown, Ohio.
2. "The Future of Clinical Photography"—Dr. Laurence D. Redway, Ossining, New York.
3. Round Table Discussion of Subjects to be Announced.

12:30 P.M.—Ladies' Bridge—Luncheon, Red Room, Mezzanine Floor.

2:00 P.M.—General Meeting (Scientific Section) reconvened, Convention Hall—Ballroom on the Mezzanine floor.

1. "Skull Injuries"—Dr. Norris W. Gillette, Toledo, Ohio.
2. "Desirability of an Early Diagnosis in Mental Instability in Railroad Employees" —Dr. W. O. McMillan, Charleston, West Virginia.
3. Symposium:
"Abdominal Emergencies Associated with Industrial Accidents"—Dr. A. M. Dickinson, Albany, New York.
"Injuries to the Abdomen"—Dr. Fred W. Bailey, St. Louis, Missouri.

"Traumatic Injuries of the Abdomen"—Dr. E. J. Reilly, Campbell, Ohio.

4. "Fractures of the Os Calcis"—Dr. C. W. Woodall, Schenectady, New York.
5. "The Use of Local Anesthetic in Railroad Surgery"—Dr. W. J. Carter, Mattoon, Illinois.
6. "What's New in the Treatment of Infections?"—Dr. Brooks W. McCuen, Syracuse, New York.
7. "Hypertension in Periodic Examination" —Dr. R. W. Cotton, McKees Rocks, Pennsylvania.
8. "The Role Played by the Physician in the Production of a Traumatic Neurosis" — Dr. J. N. Frederick, Pittsburgh, Pennsylvania.

Tuesday, September 14, Business Session:

Reports of Committees.
New Business.
Election of Officers.

7:30 P.M.—Annual Dinner in the Ballroom on the Mezzanine floor. Mr. Frank V. Whiting, Toastmaster.
"Esprit de Corps"—Major Norman Allen Imrie, Lecturer, After-Dinner Speaker, and Newspaper Man, Columbus, Ohio.
Distribution of golf prizes.
Music, entertainment, and dancing.

Wednesday, September 15, Clinical Session:

8:30 A.M. to 10:30 A.M.—Operations by Lakeside Hospital staff, Lakeside Hospital, University Circle.

10:30 A.M. to 12:30 P.M.—Dry Clinic, Ampitheater:

1. "Remarks on Surgery of the Gall-Bladder" —Dr. Carl H. Lenhart.
2. "Cardiac Trauma"—Dr. Claude Beck.
3. "Bone Repair in Relation to Fractures and Disease"—Dr. Maxwell Harbin.
4. "Hyperparathyroid Disease" — Dr. John Holloway.
5. "Newer Methods of Treatment of Fractures of the Hips"—Dr. Russell H. Birge.
6. "Amplified Percussion Studies on Bone Healing"—Dr. W. H. McGaw.

Wednesday, September 15, Clinical Session:

1:30 P.M. to 4:00 P.M. — Cleveland Clinic Hospital.
Demonstration of Cases: Discussion limited to 12 minutes.

1. Dr. G. W. Crile—"Essential Hypertension."
2. Dr. T. E. Jones—"Carcinoma of the Rectum."
3. Dr. W. James Gardner—"Subdural Hematoma."
4. Dr. W. J. Engel—"Hypertrophy of the Prostate."

Intermission—10 minutes.

1. Dr. W. E. Lower—"Late Result in a Ureteral Transplant."
2. Dr. C. C. Higgins—"Bilateral Urinary Calculi."
3. Dr. James A. Dickson—"Infectious Arthritis of the Knee Joint."
4. Dr. A. T. Bunts—"Spinal Cord Tumor."
5. Dr. R. S. Dinsmore—"Hyperthyroidism in the Male."

American Railway Surgeons

THE American Association of Railway Surgeons will hold its 1937 Annual Meeting on Monday, Tuesday, and Wednesday, September 20, 21, and 22, at the Palmer House, in Chicago. Dr. Arthur R. Metz, Chief Surgeon of the Chicago, Milwaukee, St. Paul & Pacific Railroad, has the Program in charge as follows:

MONDAY — September 20

9:00 - 9:45 A.M.

Registration — Visiting Exhibits

MORNING SESSION

10:00 A.M.

Association Program

1. "Observations: Clinical and Pathological in the Study of 510 Cases of Fatal Head Injuries"—Dr. Jerry J. Kearns, Coroner's Pathologist at Cook County Hospital, Chicago, Illinois. Discussion opened by Dr. John G. Frost, Chief Surgeon, C. & E. I. Ry., Chicago.
2. "Heart Disease as a Factor in Disability and Retirement"—Dr. Wm. C. Stewart, Cardiologist to McMillan and Kanawha Valley Hospitals, Charleston, West Virginia. Discussion opened by Dr. John C. Parsons, Company Surgeon, C. B. & Q. R.R., Des Moines, Iowa.

Chicago, Milwaukee, St. Paul and Pacific Program

3. "Collapse Therapy of Pulmonary Tuberculosis" —Dr. Allan J. Hruby, Chicago Municipal Tuberculosis Sanitarium, Consulting Physician, C. M. St. P. & P. R.R., Chicago. Discussion opened by Dr. Frederick Tice, Chicago Municipal Tuberculosis Sanitarium, Consulting Physician, C. M. St. P. & P. R.R., Chicago.
4. "Nephrolysis, Ureterolysis and Nephropexy Clinical Results in 79 Patients" with lantern slides and motion picture showing author's surgical technique—Dr. Vincent J. O'Conor Associate Professor of Urology, University of Illinois, Urologist, C. M. St. P. & P. R.R., Chicago.

AFTERNOON SESSION

2:00 P.M.

Illinois Central Program

1. "Treatment of Syphilis of the Central Nervous System"—Dr. Geo. W. Hall, Consulting Neurologist. I. C. System, Chicago. Discussion opened by Dr. Leroy H. Sloan, Internist-in-Charge, I. C. System, Chicago.
2. "Ununited Fractures of the Long Bones" with lantern slides and motion picture—Dr. Willis C. Campbell, Consulting Orthopedic Surgeon, I. C. System, Memphis, Tennessee. Discussion opened by Dr. Chester C. Guy, Adjunct Surgeon-in-Charge, I. C. System, Chicago.

Association Program

3. "The Treatment of Lesions of the Gall-bladder and Bile Ducts"—Dr. Waltman Walters, Professor of Surgery, University of Minnesota, Graduate School of Medicine, Mayo Clinic, Rochester, Minnesota. Discussion opened by Dr. Arthur R. Metz, Chief Surgeon, C. M. St. P. & P. R.R., Chicago.

4. "Hearing Aids and Their Application"—Mr. M. J. Marcucci, Audiometrist.

TUESDAY — September 21

9:00 - 9:45 A.M.

Registration — Visiting Exhibits

MORNING SESSION

10:00 A.M.

Association Program

1. "Fractures of the Transverse Processes"—Dr. Randolph L. Anderson, Orthopedic Surgeon McMillan Hospital, Charleston, West Virgnia. Discussion opened by Dr. Benjamin V. McClanahan, Company Surgeon, C. B. & Q. R.R., Galesburg, Illinois.
2. "Treatment of Burns"—Dr. A. H. Montgomery, Surgeon, Children's Memorial Hospital, Chicago. Discussion opened by Dr. Mathew A. Tinley, Company Surgeon, C. B. & Q. R.R., Council Bluffs, Iowa.

Chicago and North Western Program

3. "The Immediate Treatment of Injuries to the Hand"—Dr. Michael L. Mason, Assistant Surgeon, C. & N. W. R.R., Chicago. Discussion opened by Dr. Roscoe C. Webb, Chief Surgeon, Great Northern Railway, Minneapolis, Minnesota.
4. "Practical Consideration of Gastric and Duodenal Ulcer"—Dr. Lowell D. Snorf, Associate Professor of Medicine, Northwestern University Medical School, Chicago. Discussion opened by Dr. Edwin L. Miller, Company Surgeon, C. M. St. P. & P. R.R., Kansas City, Missouri.

AFTERNOON SESSION

2:00 P.M.

Chicago, Rock Island and Pacific Program

1. "Injuries and Disabilities of the Spine"—Dr. Edwin W. Ryerson, Consulting Orthopedic Surgeon, C. R. I. & P. R.R. and St. Lukes Hospital, Chicago. Discussion opened by Dr. James E. M. Thomson, Orthopedic Surgeon, C. M. St. P. & P. R.R., Kansas City, Missouri.
2. "Common Lesions of the Spine"—Dr. Edward L. Jenkinson, Roentgenologist, C. R. I. & P. R.R. and St. Lukes Hospital, Chicago. Discussion opened by Dr. Fremont A. Chandler, Orthopedic Surgeon, Chicago.

Association Program

3. "Newer Aspects of the Diabetic Problem"—Dr. Rollin T. Woodyat, Clinical Professor of Medicine, University of Chicago. Discussion opened by Dr. Chas A. Katherman, Company Surgeon, C. M. St. P. & P. R.R., Sioux City, Iowa.
4. "Obesity"—Dr. Leo K. Campbell, Associate Professor of Medicine, University of Chicago. Discussion opened by Dr. Rollin T. Woodyat.

WEDNESDAY — September 22

9:00 - 9:45 A.M.

MORNING SESSION

10:00 A.M.

Association Program

1. "Present Status of the Management of Gonorrhea'"—Dr. Russell D. Herrold, Associate Professor Department of Urology, College of Medicine, University of Illinois, Chicago. Discussion opened by Dr. Robert M. Graham, Chief Medical Examiner for Pullman Co., Chicago.
2. "Syphilis as an Industrial Hazard"—Dr. Royd R. Sayers, U. S. Public Health Service, Chicago. Discussion opened by Dr. Harry Eagle, Johns Hopkins Hospital, Baltimore, Maryland.

Chicago, Burlington and Quincy Program

3. "The Advantage of Surgery in Pulmonary Tuberculosis"—Dr. Casper F. Hegner, Consulting Surgeon, C. B. & Q. R.R., Denver, Colorado. Discussion opened by Dr. Richard M. Davison, Surgeon, Chicago Municipal Tuberculosis Sanitarium.
4. "A Clinical Study of Retained Intra-Ocular Foreign Bodies; Review of 300 Cases"—Dr. Wm. H. Stokes, Oculist, C. B. & Q. R.R., Omaha, Nebraska. Discussion opened by Dr. Geo. A. Hornback, Oculist, C. B. & Q. R.R., Hannibal, Missouri, and Dr. A. W. McAlester, III, Oculist, C. M. St. P. & P. R.R., Kansas City, Missouri.

AFTERNOON SESSION

2:00 P.M.

Pennsylvania Program

1. "The Company Surgeon and The Claim Department"—Mr. Patrick J. Cronin, Chief Claim Adjuster, P. R.R., Chicago.
2. "The Importance of the Restoration of Blood-Supply in Fracture of the Neck of the Femur"—with lantern slides and colored motion picture. Dr. Fred H. Albee, Consulting Surgeon, P. R.R., New York City. Discussion opened by Dr. John R. Nilsson, Chief Surgeon, Union Pacific, Omaha, Nebraska.

Association Program

3. "Treatment of Fractures of Pelvis"—Dr. James J. Callahan, Attending Staff at Cook County Hospital, Chicago. Discussion opened by Dr. Otto W. Yoerg, Company Surgeon, C. M. St. P. & P. R.R., Minneapolis, Minnesota.
4. "Pathogenesis, Diagnosis and Treatment of Horse-shoe Fistulae"—Dr. Guy V. Pontius, Consulting Proctologist, I. C. System, Instructor Surgery, University of Illinois, Chicago. Discussion opened by Dr. Arthur W. Ide, Chief Surgeon, Northern Pacific, St. Paul, Minnesota.

Anesthesia

R. M. McCown, M.D.,
Jefferson City, Tennessee

ANESTHESIA had its birth in the Garden of Eden, where God caused a deep sleep to fall upon Adam, and, as he slept, removed one of his ribs and closed up the flesh.* From then until the year 1842 A.D., we can only imagine what may have happened. The records show only manual, narcotic, and psychic unconsciousness or anesthesia.

In 1842 Crawford Long, of Athens, Georgia, discovered ether and used it extensively in his practice as an anesthetic. It was later demonstrated in Boston by his pupil, Dr. Morton; and it was left to the immortal Oliver Wendell Holmes, Doctor and Poet, to coin the word "Anesthesia." Two years later Horace Wells discovered nitrous-oxide. Two

*Read before the Association of Surgeons of the Southern Railway, Jacksonville, Florida, June 8, 1937.

years later James Simpson, of Edinburgh, discovered chloroform. Since that time, and to the present, there has gone forward a tireless search for some harmless and effective means of inducing sleep. And, thanks to these efforts, we are today living in a world where pain is practically a thing of the past. Instead of the gamble of life with each stroke of the knife, we can proceed with more deliberation and precision. However, we are still looking for a sleep that will be likened to the twilight—where, as we sit comfortably and peacefully in some favorite spot, we can fall asleep—to rest, to dream, to be refreshed, and to awaken with all the comfort, harmonies, and confidence necessary to dispel our pains and fears.

There have been many anesthetics added in the years that have gone by; many of which have much virtue and for which we are most thankful. True, some cases are bad operative risks, regardless of the type of anesthesia; but, in order to be able to evaluate the type best adapted to each case, we must acquaint ourselves with all known types.

The type I wish to discuss today is epidural anesthesia. This method is a block type of anesthesia; and is named, naturally, because of its introduction into the epidural space, extending the length of the cord. The epidural space is a closed canal from the foramin-magnum to the coccyx, and this anesthesia can be introduced without puncturing the dura and sub-arachnoid space.

Briefly reviewing its discovery and use: it is now widely used in Europe and South America; it was discovered by a young Spaniard, Fidel Pages, in 1920; Digliotte, an Italian, reported its use in 1931 before the Italian Surgical Congress; Hager, of Chicago, in 1934 reported 150 cases; Dr. Odom, of Charity Hospital in New Orleans, has used this anesthetic in several hundred cases; Gutlere, of Buenos Aires, reports its use in more than 3,000 cases. It was Guiterre who put to use the information of Holdt and Maloney, who, in, 1927, while searching for the cause of post-lumbar puncture headaches, accidentally discovered that the stretching of the spinal cord causes a negative pressure in the epidural space. The epidural space, which extends to the coccyx, is found only in the vertebral column, being closed at the foramin-magnum, which makes it impossible for the anesthetic to get into the medulla or brain.

The cranial dura divides into two layers at the foramin magnum, the external layer lines the canal as periosteum and as fibrous covering of ligaments; the inner layer becomes the dura and covers the cord. Between these two layers is the epidural space, containing venus plexis and semi-liquid fat. The dura covers the nerves to the point where the nerve emerges from the vertebral foramina, thus making it impossible to block the spinal nerve within the epidural space. The solution infiltrates the fat surrounding the dura and spreads superiorally and inferiorally, affecting nerve roots outside the spinal canal. At each vertebral foramin the solution leaves the space by way of the perinural lymphatics of the nerve trunk. Thus a massive nerve block is accomplished.

The equipment needed for administering this anesthesia is as follows:

One 2-c.c. syringe,
One medicine glass,
One small glass indicator,
One 20-c.c. syringe,
The anesthetic solution.

In preliminary preparation, as in all local and spinal, and nerve block anesthesia, the patient should be told of the type of anesthesia to be used, and should be given ¼ grain morphine and 1½ grain phenobarbital one hour before operation.

The solution is made fresh just before use—500 mg. of novocaine, 100 mg. of pontocain crystals in 50 cc. of sterile water, which gives a 1% novocaine and 1/5 % pontocain solution. I have also used very successfully 50 cc. novocaine.

The patient is placed upon the table, the skin is sterilized, and anesthetized, the No. 20 spinal needle with a short bevel tip, with stilet in, is introduced into the second lumbar inter-space, well into the interspinous ligament; the stilet is now withdrawn; and the glass indicator is connected to the needle and filled with fluid. Now the back of the patient is well arched to increase the negative pressure in the epidural space. The back should not be arched before ready to enter the epidural space for two reasons: first, engorgement of veins will soon occur to compensate for negative pressure; and second, increased likelihood of puncturing dilated vein. As the needle is passed through the yellow ligament a snap is felt, and fluid in indicator will be drawn into needle by negative pressure of the epidural space. This is our evidence that we are in the space.

The anesthetist should be a good psychologist, who sits at the head of the table and engages the attention of the patient (making him much less apprehensive, remembering always that patients hear and remember all conversation in the operating room). Otherwise the patient expresses no discomfort; the blood pressure may fall 10 to 20 points gradually, never endangering the well being of the patient.

The anesthetic solution must be of sufficient concentration to pierce the neural sheath, and sufficient quantity to contact all sensory nerves. In this type of anesthesia sensory nerves are blocked but the intercostal and phrenic nerves are not blocked.

A wide variety of operative procedures is possible under this anesthesia, and I feel that I have successfully operated several cases where local, spinal, and inhalation anesthesia were impossible or much less applicable.

The position of the patient after injection facilitates gravitation and absorption.

We have done 59 cases since January 1:

One breast amputation;
Five gall-bladders;
Three interostomies;
Ten hysterectomies;
Seventeen appendectomies;
Two cesarian sections;
One prostatectomy;
Eight hemorrhoidectomies;
Two open-bone of femurs;
Two amputations of leg;
Seven herniotomies, and
One splenectomy.

In none of these cases have we had any nerve injury, or any postoperative headaches, and in all there was little nausea, and no retention of urine. In several cases purgatives were unnecessary. We

have had two failures: in one we entered the subarachnoid space, spinal anesthesia resulting; in the other we failed because we did not get into the epidural space; local anesthesia was then given. In each case it was a failure only of technique.

When these anesthetic results are not obtained, look to your technique as your cause of failure. The cord is not injured; bulbar symptoms cannot occur, the dura not being punctured; meningitis does not occur; blood pressure is not affected markedly, and the time of anesthesia is prolonged suffciently for any operative procedure. The only objection to this practice is the length of time for the anesthesia to become effective. Fifty cc. of 2% are one gram; two grams are often used locally without harm.

Dominance of surgeons in the selection of the anesthetic is sometimes a mistake. We have many well trained anesthetists, and we should as surgeons, give them more consideration, remembering that, besides the welfare of the patient, it lessens very greatly the responsibility of the surgeon.

There is in the bosom of every man the fear of unnatural unconsciousness or sleep, and in this type of anesthesia we will do well to consider its many advantages and its few shortcomings. Insensibility to pain, produced at will, is one of the greatest blessings of science.

Industrial Operating Room

THE illustration on this page shows the operating room of an industrial surgeon in Detroit. He says of it:

"Both the industrial accident and the case presenting a problem in industrial hygiene frequently require extensive treatment on examination; and thus we have made an effort to concentrate in one office all the facilities necessary for a complete examination and complete surgical care, except for the more severely injured employee who will require hospitalization. Having operating room facilities immediately available, an x-ray department under a Roentgenologist, and a physical therapy department, as well as the usual treatment rooms, in the office, we are able to render prompt care, and frequently to carry out procedures which permit an employee to return to his work or to his home without a period of hospitalization. The length of the period of disability is shortened, the need for hospitalization is frequently avoided, and the cost of treatment can often be much reduced.

"In addition to these advantages, there is also the decrease in effort required to render efficient treatment, and the satisfaction which goes with working in pleasant surroundings; and in the case of the operating room shown, the feeling on the part of the surgeon as well as the employee that the department might be in any hospital."

"Name Your Poison!"

—A Preview of Dr. Wm. D. McNally's Forthcoming Textbook on Toxicology—

THE heading is not facetious. On the contrary, it is descriptive; for you *have* only to name the poisonous substance you want to know about, look it up in the Index, and turn to the pages—and there you will find it carefully, completely, and authoritatively described. And this is true no matter what the substance is, provided only that it comes within DR. MCNALLY'S definition:

"A poison is a substance which, when it has been introduced into or upon the body and is absorbed into the blood stream, and acting chemically, is capable of seriously affecting health or destroying life."

This definition is based on Taylor's, which, although it has been, perhaps, the most generally satisfactory, is still not as completely unambiguous as the precision of medical terminology requiries.

Taylor's definition was modified by Haines as follows: "A poison is a substance which, when absorbed into the blood, is capable of seriously affecting health or of destroying life." This, however, is still exclusive of some definite poisons.

Else Petri[1] gives the following definition: "A poison is a substance, usually soluble, which may be indifferent in itself and which, when introduced into the body, may, depending upon site, intensity, kind and duration, and also upon the actual condition of the individual, impair cellular function if the physico-chemical properties of the substance are such as to be incompatible with cellular life or produce in the cell an over-enhancing or over-depressing action."

And Kobert[2] says that the layman, the lawyer, and the doctor understand, under the word poison, different things. The doctor defines poisons as partly inorganic and partly organic substances which may be produced in the organism, or may be introduced from without in a non-organized form. These substances by virtue of their chemical properties may, under certain conditions, affect one organ (or several) of a living individual in such a fashion as to be detrimental to health or relative welfare either transitional or permanent.

And Webster[3] quotes Herter: "There is no soluble substance known that does not possess toxic properties when given in sufficiently large dose." And goes on to say: "Further, experimental proof has been forthcoming that pure water in excessive amount may produce severe poisoning and death."[4]

Taylor's definition, however, was better than most, for not many of the others would maintain their accuracy under analysis. For instance, a medical dictionary definition says: "Poison—Any substance applied to the body, ingested, or developed within the body, which causes or may cause disease." *E. histolytica*, the *Streptococci*, *B. Welchii*, and other agencies of the kind, being micro-organisms, may not be "substances", but ragweed pollens are definitely substances; and the same medical dictionary says they "cause hay-fever". Yet they are not "poisons". There are many other examples, such as some of the substances which, taken into the body, cause certain of the pneumoconioses. On the other hand, the cyanides rank as poisons which, ingested, do not cause disease—they act before there is time for anything to be caused but sudden death.

And not only Webster, as DR. MCNALLY particularly points out, but also the lesser Websters have a similar inexactness in their lexicology.

But DR. MCNALLY'S definition straightens them out; his phrase "and acting chemically" is the essence of the "poison". And from this basis he attacks the substances thus defined, and reduces *all* of them to the accuracy and order of science, with a manner of presentation that makes his text absorbingly interesting. But, first—

WHO is this man who questions thus the phrases of accepted use—who argues with the dictionary?

His career to date—and "to date" is necessary because his career is in its prime—has developed through three stages; and all the three now blend their experiences, their lessons, and their growth to the immediate and lasting benefit of the readers of his work.

First, he was a Chemist; next, and overlapping, an expert in medicolegal chemistry; and now he is Physician, Chemist, and Medicolegal Consultant on his own.

In the briefly pointed style of WHO'S WHO IN INDUSTRIAL MEDICINE AND TRAUMATIC SURGERY:

MCNALLY, WILLIAM DUNCAN, M.D.; b. Saginaw, Mich., July 8, 1882; A.B., Univ. of Michigan, 1901-05; Univ. of Illinois, 1905-06, 1914-15; Univ. of Chicago, 1916-17; M.D., Rush Med. Coll., Univ. of Chicago, 1920; intern., St. Joseph Hosp., Chicago, 1920-21; postgrad., Vienna, 1925. M., Helen Marie Pierce, 1906. Special practice, toxicology and industrial hygiene. First indust. affil., Armour & Co., 1906, as Chemist; subseq. and present, Consultant in Toxicology for numerous industrial and insurance companies. Fellow, A.M.A.; member: Illinois State Med. Soc.; Chicago Med. Soc.; Am. Chemical Soc.; Chicago Chemical Soc. Author: "A Case of Stramonium Poisoning," *J.A.M.A.*, 1915; "A Fatal Case of Cedar Oil Poisoning," *Med. Rec.*, 1916; "Acute Mercury Poisoning," (with W. H. Burmeister), *J. Med. Research*, 1917; "Deaths by Poisons in Cook County, Illinois, During the Period 1905-1917," *Med. Rec.*, 1919; "A Report of Five Cases of Poisoning by Nicotine," *J. Lab. & Clin. Med.*, 1920; "A Report of Seven Cases of Nicotine Poisoning," *J. Lab. & Clin. Med.*, 1922; "Four Deaths Caused by Sodium Fluoride," *J.A.M.A.*, 1923; "A Comparison of Mortalities from Alcohol," *J.A.M.A.*, 1924; "Six Deaths Following Fumigation with Hydrogen Cyanide," *Med. J. & Rec.*, 1924; "Two Deaths from the Administration of Barium Salts," *J.A.M.A.*, 1925; "Sixty-Three Deaths from Carbon Monoxide Poisoning in Private Garages," *Arch. Path.*, 1928; "The Distribution of Boric Acid in Human Organs in Six Deaths Due to Boric Acid Poisoning," (with C. A. Rust), *J.A.M.A.*, 1928; Carbon Monoxide Poisoning," *Illinois M. J.*, 1931; "Treatment of Eye Burns Produced by Tear Gas (Chloracetophenone)," *J.A.M.A.*, 1932; "The Tar in Cigarette Smoke and

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1. ELSE PETRI: Handbuch der Speziellen Pathologischen Anatomie und Histologie Vergiftungen, 10, 1930.
2. KOBERT: Lehrbuch der Intoxikationen, Stuttgart, 1906.
3. WEBSTER, RALPH W.: Legal Medicine and Toxicology, 319, 1930; W. B. Saunders Company.
4. Citing ROWNTREE: *Arch. Int. Med.*, 32:157, 1923; UNDERHILL and SALLICK: *J. Biol. Chem.*, 63:61, 1925; and BABCOCK: *Med. J. & Rec.*, 121:469, 1925.

Its Possible Effects," *Am. J. Cancer*, 1932; "Silicon Dioxide Content of Lungs in Health and Disease," *J.A.M.A.*, 1933; "Silicosis—An Old Disease Revived," (with W. L. Bergman), *Indust. Med.*, 1935; "The Silicon Dioxide Content of Lungs and of Placental Tissue," (with W. L. Bergman), *J. Indust. Hyg.* 1935; "Pneumonokoniosis," *Illinois M. J.*, 1935; "Manganese Poisoning Case," *Indust. Med.*, 1935; "Industrial Manganese Poisoning," *Indust. Med.*, 1935; "Carbon Monoxide," *Indust. Med.*, 1935. Special studies and research doing: dust and fume problems in industry; manganese poisoning; the role of fluorides in siliceous dust as a causative factor in silicosis (has been dusting rabbits and rats with silica for two years); has made exhaustive studies and reports on the silicon dioxide content of lungs in health and disease. Was Toxicologist for Cook County, Ill., 1913-29; Toxicologist, for Chicago Health Dept., 1929-30. Is Attending Toxicologist, Presbyterian Hosp., and St. Joseph Hosp., Chicago; Professor of Toxicology and Industrial Hygiene, Rush Med. Coll., Chicago. Is distinguished for the large number of his investigations in chemistry and toxicology, in postmortem work. Special interest: research, and consultation in industrial poison hazards.

SINCE the edition of WHO'S WHO in which the foregoing appeared was published, DR. MCNALLY has added several articles of special importance to his list of contributions to the literature of toxicology. Outstanding is the paper he presented at the Midwest Conference on Occupational Diseases, at Detroit, in May of this year. This was published in INDUSTRIAL MEDICINE for May, 1937, under the title "Industrial Exposures, and the Worker as Affected Thereby," and it attracted nation-wide, and, in one instance which has come to our knowledge, international attention. He has also added to his personal experience with manganese poisoning.

And among other items of interest not included in the foregoing sketch, is the fact that DR. MCNALLY established the first Laboratory of Toxicology in the United States, while chemist for the Cook County (Illinois) Coroner's office.

He was associated for many years with the late Professor Walter S. Haines, whom he succeeded at Rush Medical College. And he was a contributor to the text of Legal Medicine and Toxicology, by Peterson, Haines and Webster, (not, however, the Webster with whose definition DR. MCNALLY disagrees).

His writings on carbon monoxide poisoning, lead poisoning, and silicosis have been widely and favorably received. And the demand for the copies of INDUSTRIAL MEDICINE in which his articles on manganese poisoning appeared in 1935, long ago exhausted the reserve supply.

AND so WM. D. MCNALLY, M.D., is qualified to write about poisons. And he has written about them—about *all* of them, and literally and completely *all* about them. Indeed he has been writing about them for more than 25 years; and his new book—bringing the study and presentation of their origins, properties, physiological action, treatment and detection right up to date—is the result.

There are many poisons to write about—the substances which come within his definition are numbered in the hundreds. Nevertheless he treats each one with consummate thoroughness. Descriptions, symptoms, treatments, analyses, tests—chemical and biological, methods of detection, fatal dose, fatal period, deposition in the body, isolation from the tissues, postmortem appearances, statistics, and all other matters and things of whatsoever medical and medicolegal importance are covered in detail. The sections on Lead, Carbon Monoxide, Arsenic, the Alcohols, and numerous other substances are particularly, in fact, exhaustively, thorough. And the scope and treatment of all the substances are both industrial *and* non-industrial. It is the whole field of the coming together of the poison and the human body which engages this author, whatever the poison, and wherever the human. And throughout the entire text there sounds the dominant motif of his own assured knowledge of every phase of his subject in its relation to the *human* body, for he has performed so many postmortems on humans that their total runs into five figures, and a surprisingly large proportion of these were humans dead from poisons. Interesting from the medicolegal standpoint, is the fact that so many thus dead were murdered. Indeed there have been very few cases of murder by poison in the last 25 years in which DR. MCNALLY has not been engaged as Toxicological Expert by either the prosecution or the defense, and often by both in the same case. Nothwithstanding this very unusual background of personal experience with toxicological pathology, however, he draws also upon the medical, chemical, and pharmacological literature of the world; nothing of value in the writings of the last 150 years but has its accredited reference. It has been his habit throughout the last quarter-century to keep informed on poisons, and he maintains a complete index of his own on the literature of the subject from all sources. The annotations of his textbook to the important observations, experiences, and conclusions of those who have contributed to the literature comprise more than 2,000 references, including the very latest—some, in fact, as late as August, 1937.

HERE, then, in TOXICOLOGY—MCNALLY is the final round-up of medical and medicolegal knowledge of and experience with the substances that poison human beings, and how and why they poison them. Obviously, it is a big book. Cyclopaedic in its scope, meticulous in its treatment, it fills 1,200 pages with text matter which will hold the attention, sustain the interest, and fill the needs of physician, chemist, and medicolegal expert alike. It is not written *to* any one professional group, but it is written *about* a subject, and the interest, therefore, is reflected from the pages in proportion as it is brought to bear upon them. Yet, in the magic manner of sure knowledge and profound experience, it is not only a textbook, but a reference book as well, combining the maximum values of both features, either of which—when as well done as here—would be distinction enough.

Certain mechanical features of the book are noteworthy—for example, the type in which it is set. This is known as Excelsior, selected because of the rating given it by the experts in such matters as the most satisfactorily readable, and the easiest upon the eyes under sustained use. of any type face yet devised. There is an illustration of this in the page of the book reproduced opposite the inside front cover herein. The binding of the book is designed for permanence. And the Index is carefully worked out for the utmost facility in making quick use of the vast amount of information here assembled.

TOXICOLOGY—MCNALLY is on the presses. It is being published by INDUSTRIAL MEDICINE, and will be ready for delivery October 1, 1937.

Industrial Medicine

Reg. U. S. Pat. Off.

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Dirt on the Doorstep!

POSSIBLY too naive, in this sophisticated age, is that philosophy of life which can hold to the ideal of the better work expressed in Elbert Hubbard's quotation, by gratuitous credit, from Emerson. A period is upon us when the gauge of good is principally "will it sell?"—and the "better mousetrap" lures no mouse, and the "better book" remains a manuscript unread, if its "better" has less than a very intimate relation to its sales appeal. "Box office" for the play, "gross" for the picture, the "best seller" list for the literature—these are the standards of our excellence. And merit is a jockey unknown unless it rides, and wins, on "Profit." It is a frothy time. Emotion does for thought; sophistication bubbles in "wisecracks"; culture seems a welter of gadgets in a wallow of publicity; the silence of contemplation is shattered by happy voices urging "buy a pound tomorrow!"

This, however, since it cannot be helped, must be endured. Ultimately, too, it will be out-lived, outgrown. But, while it is here, it produces certain phenomena which are always interesting, sometimes disturbing, and once in a while funny. And not the least funny is the almost universal urge to play "follow-the-leader." Everybody plays it, but its vogue found its most powerful impetus in the "emergency politics" of the depression: "Follow me!"—the "new deal!"—the "more abundant life!" etc., etc.—to those who would do their own thinking, *ad wearium*, and now since the emergency subsided, and the Supreme Court exterminated NRA, to those and many more, *ad nauseum*.

But the game, for the most part, goes on—with the natural sequel of its popularity that some of the highly-placed followers, feeding on the strong meat of their leader's temporary success, have become ambitious of a leadership of their own. With all the blah and braying about the "new social order," and "regimentation," and subordination of the individual to the state, the indviduality which is inherent in American institutions breaks through; and the game as they would play it becomes less "follow" the leader, and more emulate.

This, however, is the American spirit, traditional in American life, essential to American integrity. And thus it is commendable in itself. It is only the desire for personal distinction—and long, indeed, may it be until there is no longer in this country the free opportunity to satisfy that desire!

BUT when that desire is satisfied in other ways than by the "better work" done by the individual it is very likely to be satisfied wholly or in large part at the expense of other individuals. And then it ceases to be commendable, and becomes one or more of those opposites which range from criminal to silly.

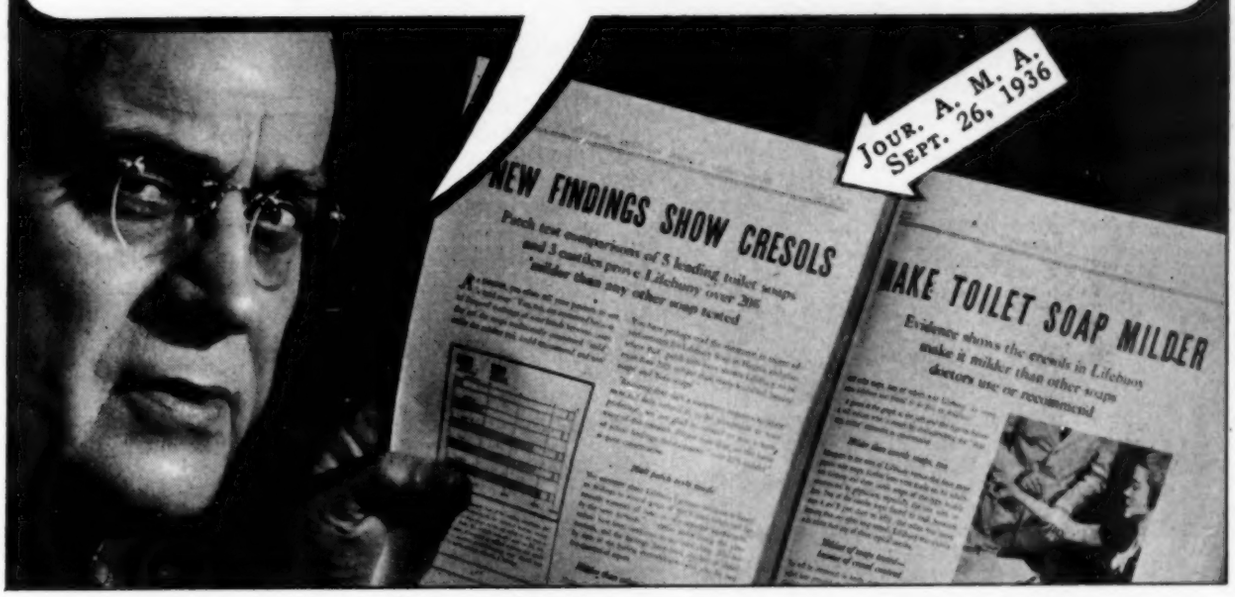
As an illustration of the latter, the bill submitted at the session of Congress just adjourned to "Compel Doctors to Aid Indigents" is outstanding (see p. 483). Proposed by a crafty "follower" in the larger spheres of political action, it has no sensible basis in necessity or fact or theory. Its only reason, almost confessed in its proponent's explanation, is that the Senator is seeking a field of his own in which to be identified as a leader.

Aside from the serious effects of this bill, (or any similar bill, if one should become law), is the unwarranted slur the very proposal casts upon the *one* profession which still maintains its ideals. Any attempt to make it illegal for medical men to fail to do what they have always done, and are doing, and will continue to do as a matter of their professional integrity and without any law, creates the impression that a law is needed to make them do it. What other impression is possible from such headlines as the ones the newspapers gave to this attempt?

Thus does the opportunist invade and desecrate the last remaining sanctuary of professional decency. The "better work" has been distinctive of the medical profession since time immemorial. Even where it wasn't "better", and was only average, it is much too decent for such imputations—so decent, indeed, that it will survive them with no permanent injury. For, in any apposition of dirt and ideals, the dirt is very soon apparent for what it is.

Meanwhile, this instance of the kind of statesmanship (?) that is evidenced by such pandering to the frothy plaudits of the unthinking is one more reason for the inevitable verdict of history that the "new deal" was a "dirty deal." Notwithstanding that because of the "better work" of the medical profession the world *is*—literally, as well as figuratively—making a path to its door, the best the "new deal" can offer is the picture of the clumsy feet of its "yes-man's" insincerity tracking dirt upon the doorstep.

This is worth keeping! Have you a reprint?



Patch tests on 3 castiles and 5 leading toilet soaps prove Lifebuoy over 20% milder

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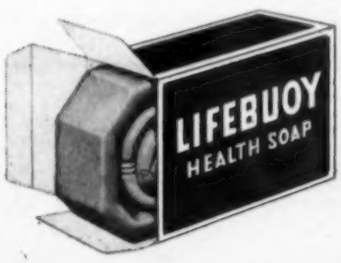

Occupational Diseases and Industrial Surgery

Industrial Hygiene — Its Historical Development and the Modern Campaign

MAN in the pursuit of his work has always been exposed to hazards no matter what the work was.* The stone-age man gathering his food, hunting animals and building a place for shelter, was subject to bodily harm.

We are inclined to value a civilization according to its artistic achievements. We admire the pyramids and temples of ancient Egypt which have survived the centuries, but we forget that they were built with the blood and tears of human beings. The human beings in those days were primarily slaves.

We also admire the graceful Greek bronze statues that fill our museums, but we do not think of the copper miners providing the materials, or the coal miners digging the coal to make the bronze, working in narrow galleries suffocated by the heat, smoke and dust.

The ancient physicians were keen observers and noticed the influence of certain occupations on the workers' health, but they were not actually interested in the health of the manual laborer, devoting their attention almost exclusively to the upper class.

The middle ages scarcely made any contributions to this subject and it is not before the end of the fifteenth century that we begin to find special literature devoted to the industrial diseases.

Voyages of discovery at that time were not in the interest of science, but primarily in search of precious metals and minerals.

In 1473 a German physician, Ulrich Ellenbog, wrote a pamphlet of seven pages on "the poisonous wicked fumes and smokes." It covered the illness observed among the goldsmiths.

Mining was the most dangerous occupation of the early days and, therefore, received attention first. An example of this type of literature is Agricola's work, published in 1556, where he described the various hazards that threatened the miners' health. Scattered observations on industrial disease followed and attempts were made then to describe their clinical picture.

In 1700, the famed Italian physician, Bernardino Ramazzini published his famous book, "A Treatise of the Diseases of Tradesmen." It is a medical classic, the first textbook on industrial diseases. He described the various trades and their health hazards, indicating methods to prevent the diseases. His textbook outlined to the medical world a new subject.

The eighteenth century had little to add to what Ramazzini had already said and described.

In the early nineteenth century, the industrial population increased tremendously in England and the people were then working under appalling hygienic conditions. Life expectancy was short and the death rate high. Public interest was aroused. The work of the physician was important but it was obvious that conditions could only be improved by way of legislation. The first "Factory Act" was passed to remove the worst abuses. In spite of this, conditions were still bad.

France and later Germany drew the attention of the public to the health conditions in the working population and soon found it necessary to establish industrial codes for safeguarding employees.

In the United States the literature on industrial diseases began in 1837. Factory legislation followed from the middle of the century on and developed rather slowly.

It is not until the twentieth century that there was a real improvement. The World War proved to be a strong stimulus. Workers were scarce. Their health, therefore, meant a great deal. Research was done and industrial clinics opened. There can be no doubt that working conditions have improved greatly in most civilized countries.

In relating the subject of the modern campaign in "Industrial Hygiene," there may be several ways in which to approach the subject. I feel that by attempting a brief survey of the general principles we can better visualize this broad field and its many important aspects. I am only touching the fringe of this specialty, but progress can only follow on accumulated knowledge and it, therefore, behooves each of us to make our individual contributions.

This complex and highly mechanized hemisphere of ours has brought about a complete revolution and rehabilitation of industry. Inventions brought into existence new materials, new machinery, new processes. It so subdivided labor that women and children became a factor in many classes of industry not previously opened to them. As time marches on we may expect many more such changes to take place. All these have brought new stress upon the tissues of human beings. In other words, the mind and the body are in a continuous struggle for supremacy over the factors that operate insidiously or acutely, to injure the body structures or alter their activities in such a manner as to interfere with the full enjoyment of life and its normal span of existence. The end results of such factors, caused by toxic and irritant industrial substances and deleterious work-room environments, are classified as occupational or industrial diseases.

Perhaps it may be easy to estimate the result of bodily injury or award a fixed rate of compensation for the loss of life, but it is far more difficult to estimate the insidious and progressive effects of occupational diseases.

As physicians, we are concerned about any condition which will shorten our lives, and where the relationship is clear, we demand that something be done about it. The many causes of ill health, lingering disability and deaths among our industrial population can not go unrecognized.

There must be an enlightenment and respect for this field of preventive medicine. If causes of ill health exist in industry, we must find the wells and springs of their origin. It behooves us to put into effect the discoveries and advances made in medicine, the result of which will be reflected by increased industrial longevity.

Heretofore, the chief requisite of a physician who had an industrial practice was that he be a good man and well qualified surgeon. Today, the employer and the employee are demanding much more than curative medicine and repair work.

There is now an intelligent demand for the application of the principles of preventive medicine, and that means that the physician, interested in this phase of public health, concern himself with the workings and activities of all departments within the walls of the plant, where his influence and full responsibility of service will be realized.

Fundamentally, the science of medicine is applicable to industry. If we are to be true to our generation, and in our day contribute as the bacteriologist did 50 years ago, and as the nutritionists have done in recent years, we must use our powers of education, of information, of inspection and abatement, to make all employment as nearly compatible with health as our knowledge permits.

No branch of medical science has come so prominently to the front in recent years as industrial hygiene. Its rise has undoubtedly been due to the fact that it renders a service of value.

To the working class it has been tremendously beneficial.

To industry it has proved satisfactory and profitable.

To the medical profession it has opened up new avenues of usefulness. The physician must take a definite and dominating part in this activity designed for the physical conservation of the worker. Industry needs him and medicine must supply him.

In considering the physician's activities in this preventive field, his first step is in the conservation of energy and health in addition to learning the facts of the physical condition of the workmen.

Physical examinations in industry should not be made primarily for the purpose of exclusion, but designed for the proper selection and placement of the worker. The sub-standard worker is also worthy of special consideration. He can be given suitable, selective employment without forcing him into idleness. Many of them are capable of some useful production.

The physician must appreciate and acquaint himself with the factors favoring the action of toxic compounds and consider them of value just as he values the factor of lowering the resistance of the body, interference of elimination by the renal and gastro-intestinal tract; the factor of hastening skin absorption by un-

* MILTON H. KRONENBERG, M. D., Chief, Division of Industrial Hygiene, Department of Public Health, State of Illinois, Chicago; Read before the Section on Public Health and Hygiene, Illinois State Medical Society, Peoria, May 18, 1937; Published in *Illinois M. J.*, July, 1937.

OCCUPATIONAL DISEASES

The General Assembly of the State of Illinois has recently passed an Act, covering occupational diseases of Industrial employees. This Act is particularly concerned with diseases of the lungs, and poisoning from certain chemicals.

Under this new law it will be necessary for many industries to examine their present employees, and new employees, to determine their present health status and thereby prevent future liability.

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natural environments of humidity and heat; exertion, which increases the respiratory rate and depth and so increases the amount of inhaled toxic materials; long hours, which means a larger dose of poison and shortens the period during which elimination takes place.

Since individual susceptibility to toxic and irritating substances varies, as is well known by our toxicologists, the physician should not be influenced by the non-cooperating employer who argues that what is dangerous for one worker is dangerous for all.

Although we accept the variation in susceptibility to infectious diseases, many physicians are reluctant to accept this fact of varying susceptibility of industrial poisons.

It is further obvious that the physician who aspires to practice in this special field of preventive medicine should need training before he can qualify in that capacity. We should, therefore, be concerned about the facilities for training these men. Some medical schools have exposed the undergraduate to this specialty by a few lectures required by the regular curriculum, but out of necessity and due to the lack of trained medical personnel, a post-graduate course of sufficient extent with definite requirements is paramount and urgent.

The physician who desires to carry on this work should have a fair knowledge of the physiological aspects of ventilation. He should know under what conditions it is desirable to take air and dust samples, and what methods should be employed in analyzing them. He need not necessarily be familiar with the technic of analysis, but he should know when such proceedings should be resorted to. He should know something about the industrial effects and exposures to noise, vibration, monotony, fatigue, posture, and appreciate the factor of sex as it affects women. He must be able to recommend who is best suited for heavy duty, wet and damp environments, extremes of temperature, etc. The physique, the mentality, the movements and morals of the employee are all his problem, and he must deal with them as individuals.

This public health undertaking is of course not a one man job. It is only the joint activity and cooperation of all agencies interested in this field that will probe the disabilities of industrial environments.

Many employers today realize that the subject of health vitally concerns their industrial problems. If they are to secure and maintain high efficiency in a working force, then both health and safety must receive proper consideration. It is not a charity; it is a duty.

An industry that applies the principles of modern medicine to the shop workers, sick or well, supplementing the remedial agencies of medicine by the application of work-room welfare provisions, has an adequate and cooperative appreciation of the social and economic problems of industry in its relation to society.

The workmen's only real asset is his health. When he loses his health he loses everything.

Some employers have taken up the problem of industrial health preservation and protection without compulsion; others it appears will have to be forced into it.

For years the nature of this work was chiefly a legal function, devoting all its time to accidents and so required no training in hygiene and the fundamentals of public health. Health, it was felt could take care of itself, and so there existed disastrous forms of ventilation and many poisons were tolerated.

The old practice when some fume, gas or dust became objectionable in a plant—and it had to be objectionable before any attention was paid to it—was to put in a home-made exhaust duct and fan. In most cases it was a complete failure and oftentimes increased the hazard or created others.

The engineer has a definite place in this panel. Since each process in an industry has it own definite problems, the engineer can ascertain the conditions of the work-room environment and design methods of control. His occupational analysis should be very informative.

Compensation boards must also lend their aid. Although it is not a problem primarily of compensating the victim of an exposure, compensation seems to have succeeded thus far in dominating the immediate picture.

We cannot compensate vigorous health. Our pressing problem is the prevention of disease. The necessity for treatment is the badge of, and compensation the penalty for, failure. I should like to emphasize the need and importance of medical men on these compensation boards.

In addition the preventive program includes strong and unbiased legislation. Safe practices and standards are being encouraged and set up wherever toxic and irritating substances are involved. The regulating of the responsibility is also being clearly defined and established.

The proper machinery for enforcement is also necessary. This is applied whenever there is utter and willful disregard for the codes, rules and regulations covering our safe practices and standards. This is best administered through a State Labor Department.

Monumental investigations and research activities have already been done covering some of the subjects in this field by many outstanding scientists and colleagues of ours. In this State we remember and are proud of the valuable contributions and early investigations made by Apfelbach and Hamilton.

Many potential hazards may go undirected and unrecognized, if there is not a continuation of research in this field.

Another great need now is the industrial hygiene laboratory. It is necessary for the study and measuring the extent of exposure to injurious materials, as it is an important factor in the control of occupational diseases. The establishment of such laboratories should be in units charged with the control of this public health problem. A laboratory of this type must be specially designed and equipped. Industry and manufacturers of the many products used in industry may lend their aid by laboratory research and investigations involving the toxicity of many of their products before they are put out on the market, and where they are known to be harmful, to label them so, in addition to informing the user as to the safest method of handling them.

It is also proper at this time to say a word about the degree of efficiency and usefulness of safety equipment and the protective garments used in industry. It is not the intention of the physician to minimize the value of safety appliances. It should be obligatory to comply with state safety codes, but the human element in industry is a complex problem and cannot be solved entirely by mechanical means.

In line with the demand for improved technic in industrial hygiene, we should not overlook the need for the proper training of our state factory inspectors. With a qualified type of individual doing this work, whose judgment will be valued and respected, many hazards can be uncovered.

The statesmen of our modern age, because of their broad vision and human understanding, may also lend a helping hand in arousing and encouraging the need for healthy working environments. They can clearly set forth its human aspect and make our citizens understand that life is not counted by years, but by the length of useful service rendered. This was clearly brought out in one of the celebrated addresses of Disraeli, who said:

"Public health is the foundation upon which rests the happiness of the people and the power of the State. Take the most beautiful kingdom, give it intelligent and laborious citizens, prosperous manufacturers, productive agriculture; let the arts flourish, let architects cover the land with temples and palaces, and in order to defend all these riches, have a first-class navy and a powerful army, but, if the population remains stationary, if it decreases yearly in vigor and in stature, then that nation must perish. And that is why I consider that the first duty of a statesman is the care of the public health."

The industrial nurse may be of further assistance since she frequently sees a worker before he reports to the plant physician, and can oftentimes supply information that assists in the diagnosis, where there has been an occupational exposure.

A detailed occupational history is essential for establishing diagnosis in these cases.

The influence of the family doctor is very great in America, and if these family physicians do their full part in this campaign, they would accomplish more than any lay commission. Not that they should replace all other agencies and groups interested in this work, but rather join them and support their efforts.

The campaign of interest in this work would be lax if we were to overlook the necessity of keeping and acquiring morbidity and mortality statistics in industrial undertakings. It is only through these actuarial tables that we can direct our efforts to the more hazardous trades and industries.

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Back Disorders of Psychic Origin

INTEREST in back symptoms and disabilities has increased tremendously in the past decade, particularly in line with advances in diagnostic measures.* For example, cases of cord damage produced by an invasion of a portion of the intervertebral disc, are being recognized with greater frequency, as a result of more accurate x-ray studies, aided by lipiodol.

Back conditions resulting from organic disease of the cord and its coverings, have thus impressed themselves in the foreground of consciousness of the physician. A similar attention has been directed to the pains and aches radiating posteriorly from visceral disease. The close association between pelvic pathology and symptoms in the lumbo-sacral area, is well known.

Too little attention, however, has been directed to symptoms in the back arising from or aggravated by emotional states. The subject of verterbral neuroses or back disorders of psychic origin has received scant recognition in contrast to the thorough delineation of other functional states. For example, cardiac neuroses and gastric neuroses are recognized clinical entities.

* DR. JOSEPH L. FETTERMAN, from the Neuropsychiatric Service, Lakeside Hospital, and the School of Medicine, Western Reserve University, Cleveland, Ohio, read before the Orthopedic and Industrial Section of the Academy of Medicine of Cleveland, April 21, 1937, and published in *Ohio State M. J.*, July, 1937.

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Certain textbooks dismiss this subject with a few paragraphs on "railway spine"; others may not even mention it. In an excellent section on lumbo-sacral and sacral backaches in Nelson's System of Medicine,[1] the functional phase of the subject is hardly touched. In Barker and Thresher's[2] book on backache, one case is reviewed in detail, a depressed patient presenting largely back symptoms. The subject receives a more thorough recognition in the comprehensive paper by Riley,[3] entitled "The Neurologic Aspects of Low Back Pain".

An important explanation for the apparent neglect of back neuroses may be ascribed to the fact that such patients present evidence which, at first glance, appears to be structural. For example, there may be muscle spasm, abnormal postures, peculiar gaits and x-ray evidence of hypertrophic changes.

At the outset, the author wishes to state that this paper is not intended as a challenge of the many organic disorders of the back. Indeed, every effort must be made by thorough local, as well as systemic examination, to discover a structural or toxic cause. (I have found Mennell's[4] book an excellent guide for such examination.) It is only when a painstaking study is negative and where the past history of the patient, the peculiar nature of the symptoms or the personality of the patient bespeak nervous illness, that the consideration of a "vertebral neurosis" has its place.

The symptoms of a "nervous back" resemble closely those produced by organic disease, in the same way as nervous indigestion resembles the symptoms of ulcer. This is obvious when we realize that psychogenic ills are usually expressed through physiologic mechanisms and conform to physiologic patterns. The outstanding symptoms in the group of vertebral neuroses are:

1. Pain and paresthesia.
2. Weakness.
3. Limitation of motion with abnormal posture and disorders of gait.

The back pains of the neurotic are frequently described with adjectives of vivid intensity: burning, freezing, tearing, pressing and torturing. Such pains may represent a hypersensitivity of the posterior nerve endings of the thoracic and lumbar spine. They may arise from vaso-spasm in the arteries of the muscles, or they may occur secondary to muscle spasm.

More important than the sensory symptoms are the motor difficulties. There may be weakness of an extreme degree: "I can't lift the lightest weight". There may be muscle spasm, limiting motion to the stiffness of a poker spine. In some instances severe scoliosis may be present, causing the patient to turn far over to one side. This weakness or peculiar posture represents a disorder in the tone of the large, important paravertebral muscles.

Mind and muscle are an inseparable combination. Emotions are externalized through muscular apparatus, as well as through viscera. Ideas were expressed through actions long before there were words. Indeed, the emotions dominate muscle tone: picture the melancholic droopy at rest and slow action; the maniac leaps and dances; terror may freeze us stiff.

cause us to tremble or to fall limply in a faint. "When I get excited, my back is all tied up in a knot," says Francis L. Emotional illness, such as anxiety neurosis and hysteria, may produce tics and tremors, increased muscle tension or paralysis, hysterical monoplegia or even hemiplegia. If there is increased tone in the erector spinae group, there will be rigidity. Should this tone be more pronounced on one side, there will be a scoliosis.

For example, J. S., who was referred to me by one of our leading orthopedic surgeons as a case of functional back disorder, is reported to have walked with an extreme turning of the body to the left. Mrs. M. M., whose case will be reported in detail later, showed a moderate scoliosis. The marked weakness that some patients present is associated with a state of mental depression. A recent example of disturbed muscle tone occurred on the orthopedic service of Dr. Harbin at Lakeside Hospital. A young man is his early twenties was admitted through the emergency room with a complaint of pain in the back. He gave a history of fall, with a blow in the lumbar area. The initial examination revealed intense, bilateral spasticity of the lumbar muscles, resulting in almost complete limitation of motion. The young man was placed on a hyper-extension frame.

During the subsequent days x-ray examination were found to be negative. A neurologic study showed, in addition to the back symptoms, peculiar areas of anesthesia. This aroused suspicion of possible psychogenic illness. A psychiatric interview revealed a story of bitter disappointment in his earlier family life and a series of discouraging experiences in his attempt to face the world. The search for work had proved consistently futile. As a last resort, the patient got a room in a basement in exchange for firing the furnace. It was during the performance of this duty, that he slipped and struck his back. In view of this history, briefly summarized and the un-physiologic areas of anesthesia, I decided to try as an experiment the effect of suggestion, through local, chemical application and massage. The young man was reassured with the firm conviction that he would be cured. A strong-smelling liniment was applied and a form of manipulation given. After a brief, but apparently impressive treatment, the suggestible youth was assured that he could walk straight. The young man was apparently extremely susceptible to this type of therapy, because he climbed off the hyper-extension frame and was able to walk with perfect posture.

More important for the understanding of back symptoms are the psychologic features which will be next discussed.

Psychologic Features

THOUGH the psyche may express itself along physiologic pathways, through symptoms which conform to physiologic patterns, yet it is capable of dominating physiologic reactions. The resulting symptoms stand as an embodiment of an idea. It seems as though the entire soma was in the service of the ego, translating this idea into bodily symptoms.

As I have pointed out in a previous

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paper,[6] there are many individuals inwardly unhappy, overburdened by cares and worries, intensely dissatisfied with the drudgery and dangers of earning a livelihood. Such individuals are susceptible to neurotic illness; some are more prone to back symptoms.

The localization of illness to one region will depend upon a combination of inherent factors and external circumstances:

1. *Inherent weakness.* A region of the body congenitally impaired, affected by previous diseases or fatigued by over use, arouses considerable attention. This attention may provoke an introspective attitude with self-examination. Such an individual may attempt to look at himself or herself with a series of mirrors, observing abnormalties. Such "changes" are often interpreted or misinterpreted as being rather serious. The item of inherent weakness is perhaps less important in back cases than in other disorders. One frequently finds an individual who has become heart-conscious as a result of attention directed to the heart through the diagnosis of a murmur or an extra-systole. Hysteria will readily attach itself to an area which has aroused conscious interest.

2. *Identification.* The mechanism of identification is of great significance in explaining the localization of many neurotic ills. From the medical student who reads of certain maladies and then applies the diagnoses to himself, to individuals who "acquire" illnesses of their loved ones, this mechanism is operative. If a close friend or a person with whom one is intimately associated suffers from a serious ailment, then a potential neurotic individual, by auto-suggestion, may develop a similar complaint. I was recently consulted by a young man of 25, complaining of headaches and asking in a trembling voice, "Doctor, do you think I am going to have a stroke?" He not only mentioned headaches, but was upset by the fear of becoming paralyzed. A brief inquiry elicted the fact that his mother, aged 65, had suffered from cerebral hemorrhage some weeks before.

The factor of identification operates in those individuals who read of diseases in the newspapers or who during epidemics acquire similar symptoms.

3. *Psychoanalytic explanation.* Franz Alexander[8] made a careful study of the type of neurotic individual who develops gastric ulcer symptoms and has reported a certain combination of psychic factors as favoring such illness. Wilson,[7] from Alexander's clinic, reported a case showing back symptoms and mentioned sex symbolism as sometimes connected with back disorders. Likewise, Schilder[5] in discussing location of symptoms, stated that organs which possess an over-measure of libidinous tension, may become the object of hypochondriacal attention. This interesting psychoanalytic explanation may be necessary in understanding certain instances of back disorders.

4. *Trauma.* In my experience I find that trauma and the psychic value of symptoms are more important. If a region of the body has been injured, the resulting pain, discoloration and deformity will arouse immediate attention. If the back has been injured and there is weakness and stiffness, fears of weakness and crippling may take root in susceptible soil. Considering the number of falls in which the back is hurt, trauma becomes an important mechanism.

5. *The value of back localization to the psyche.* It has been remarked by Alvarez[3] that certain phrases are impregnated with physiologic wisdom. This statement was used in explanation of the common idea, "I can't stomach a certain food or a certain situation". Appropriate to our problem are such terms as: "I can't stand it; I can't carry on; I can't carry my burden". Such ideas are best dramatized by a weak, painful and deformed back. I believe that the symbolic value of the symptoms is perhaps the most important factor in the localization in the vertebral column. This may be inferred from the comparative infrequency of major back symptoms in a neuro-psychiatric clinic as contrasted to the large number of back neuroses that occur in industry. In a psychiatric dispensary one encounters patients who have widespread symptoms or such common complaints as heart weakness, indigestion, impotence, insomnia. Many industrial cases, as most orthopedic surgeons realize, are patients who complain more of back weakness. Such complaints are symbolized by the thought, "I can't continue at my job; I can't carry on". Impotence or indigestion would not serve as adequate reasons for excuse from work.

THE BULLETIN
of
The American Association of Industrial Physicians and Surgeons

THE object of this Association shall be to foster the study and discussion of the problems peculiar to the practice of industrial medicine and surgery; to develop methods adapted to the conservation of health among workers in the industries; to promote a more general understanding of the purposes and results of the medical care of employees, and to unite into one organization members of the medical profession specializing in industrial medicine and surgery for the mutual advancement in the practice of their profession.

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Back Disorders in Industry

FOR the many reasons discussed under the subject of localization, industrial patients are more apt to develop vertebral neuroses than private patients generally. In the first place the normal strain and weariness of a hard day's work may be settled in the back region. Obviously a laborer, worn out by a day's toil may complain of pain and soreness in the lumbar area. Next is the matter of actual external violence. Heavy lifting, sudden twists, falls on the lower end of the spine, as well as injury from collision, are apt to damage the back. The injury produces initial pains, draws attention to the area and serves as a localizing factor for anxiety and fear. More important is the psychologic mechanism already reviewed. A clerk might develop headache, visual disturbance or tremor of the hand. The laborer is more apt to develop back symptoms. I have observed this fact so regularly as to wonder at the mystic wisdom of the subconscious which seems to recognize the advantageousness of certain symptoms. The back rigidity, the deformed posture, the dragging gait dramatically translate the psyche's wish for the individual to be freed from the drudgery and danger of his work.

CASE HISTORIES: W. J., referred by Dr. C. Heyman,[1] a youth of 26, came to this country at the age of 15, a tall, ambitious though shy youngster. He was eager for further schooling but his stature and accent made him the laughing stock of his classmates. He went to work in a factory and attended night school, so as to improve his education. Just as he was making some progress, the depression came and with it the loss of his job. During the period of idleness, faced with starvation, he gradually relinquished his plan for a scholarly career and at last took a job as a street-cleaner. You may imagine the state of mind of this sensitive, studious youth, counting his minutes sweeping the streets with his large heavy broom. One day he slipped and fell, sustaining a trivial back injury. He was seen by a physician who strapped the back. The care and attention pleased him and the disability payment gave him a sense of inner satisfaction. Somehow he was getting revenge against the cruelty of the world which had mistreated him. He was referred by the Industrial Commission of Ohio to Dr. Heyman. The doctor's extensive examination was negative. Dr. Heyman and I were both impressed by the Apollo-like, handsome appearance and splendid, symmetrical musculature of the back. Despite the apparent, normal structural status, the youth walked feebly and complained consistently, "My back is weak, I can't lift, I can't walk, I am tired, I must lie in the sunshine." In this instance the fall with the resulting pain, permitted an escape with honor from a shameful, unpleasant work situation and secured an inner feeling of revenge against society.

Another case is that of Mrs. M. M., aged 32, occupation waitress, referred by Dr. McCurdy of the Industrial Commission of Ohio. Several years prior to my examination Mrs. M. M. had slipped down the stairway of a restaurant and bruised the lower back region. She developed pain in the back, stiffness and weakness in the legs. In the course of time there was a visible scoliosis, which caused her to walk in a position of pes equinus of the left leg. This condition had been of three years' duration when she was placed in Lakeside Hospital for study and treatment. Because of the marked postural deformity, I called into consultation Dr. M. Harbin, who concurred in the diagnosis of hysteria. I talked with Marie during the course of several days, gained her confidence and stated that I believed that she could be helped. In this instance I tried a lumbar puncture as a psychotherapeutic measure. Marie was told an injection would be made into the painful nerves. Following this procedure the patient was able to stand erect and to walk with little or no limp. Her gait improved remarkably. Shortly after leaving the hospital she was able to walk regularly. One-half year later when she was faced with an additional economic burden, the complaint of back pain recurred. The exact mental mechanisms in Marie's case were not evident. The more obvious were economic difficulties, small wages and dissatisfaction with the work.

When Riese" described "traumatic neuroses as a protest of labor against capital", he probably pictured an unhappy workman, dreading the dangers of his work and disgusted with the monotony and insecurity of it. When such a person develops pain in the back from strenuous lifting or as a result of a fall, his period of disability may prove long.

The other day an orthopedic surgeon, Dr. Stern, referred to me a Mr. J. of Akron, who has had back symptoms for some 10 years. A great variety of treatments including braces, manipulation, casts and operative procedures failed to help. In the course of the first interview Mr. J. explained that he was a communist, that his chief interest is to fight capitalism. It is quite obvious that he is using his back symptoms as a weapon. As a back invalid, he is relieved of the unpleasantness of his toil and is revenging himself against his employer. (Mr. J. is a "sit-downer.") Indeed such patients were the original sit-downers!

It is obvious from these case histories, briefly summarized, that one must look beyond the back and at the background. The posture, gait and complaints are telling a story, a story of an individual contending with the major factors in life. That this viewpoint is not theoretical is evident from the experience of many orthopedic surgeons. One of them who has discussed this subject with me, reviewed some 15 back cases of industrial patients in whom he had done some type of operation. He could recall but one or two of this group who was rehabilitated by the operation sufficiently to return to work. If a patient has some inner, psychic reason for his symptom, the surgical procedure will be welcomed far more as an evidence of disability, than as a means to get well. Some of these patients seem to cling to braces, even wearing them at night in sleep. The brace supports the claim more than the vetebral column.

Obviously not all vertebral neuroses are the result of trauma or the work situation. All of us have encountered cases in general practice. B. L., who had consulted me because of a neurosis, stated that his mother would be confined to bed with a back pain and weakness, whenever an unpleasant domestic difficulty arose.

Recently I have seen a case at the dispensary of Lakeside Hospital, a girl of 22, whose home life had been unhappy. Father and mother were constantly quarreling and Miss B. was often in a state of insecurity. She was short and inclined to obesity, had become self-conscious and had few "men friends". About two years ago she slipped on the threshold of her home and landed on the end of her back. She complained of intense pain in the region of the coccyx. The x-rays showed a slight forward-bending of the coccyx and this bone was removed. The symptoms, however, were not relieved. The pain was as intense as ever. She seeks further surgical procedures in the hope of getting help. Yet her tragic attitude may be seen in the following lines of one of her tragic poems:

"Perhaps in later years Time shall have passed
Her healing hand across my heart to bring
Blessed relief from this soul-twisting pain;
I may have peace and be content again."

Obviously, in back neuroses as well as in cardiac and gastric neuroses, emphasis is placed on the outstanding symptom group, though the other symptoms are frequently present. In only certain patients are neurotic symptoms limited to one structure or one function. More commonly the symptoms are widespread or they shift from one region to another in the course of time.

Back symptoms are frequently associated with pains and weakness particularly in the lower extremities. In other instances, there will be aches and pains and disturbed function in any part of the body. The combination of back disorder with pain or weakness in the legs is rather frequent.

About a year ago a Mr. R. P., aged 30, was referred from Steubenville by Doctors Koepf and McCurdy of the Industrial Commission. Roland was thrown from the seat of a runaway horse and wagon and his back and thigh run over by its wheels. He was taken to a nearby hospital and given care for several weeks. In the hospital his chief trouble was pain in the back and weakness in the legs. While under observation he found himself almost unable to move his legs. After some months of treatment, he was referred to an orthopedic surgeon and a Thomas walking brace applied to his right leg. He had worn this apparatus during a period of several years when he was sent to Lakeside Hospital for study.

Roland complained of pain in the back and of weakness in the right leg. When asked to raise the leg, he performed the act very slowly, assisting the thigh muscles with his hands. A complete neurological examination showed no atrophy and no reflex changes.

A brief psychiatric study elicited a

history of a dependence upon his wife, who was some 15 years older and who nursed and mothered the patient in a protective manner. Though large, Roland was inclined to be shy, resembling the Froelich type of body build. He seemed to enjoy the warm, soothing care, which his illness provided for him. With a diagnosis of hysteria rather evident and having gained Mr. R. P.'s confidence in the course of 10 days' study, I told him that I would certainly be able to cure him. The treatment was finally accomplished through the aid of faradic electricity. The current was applied to the peroneal nerve, causing the foot to contract and the leg to jump actively. The patient was startled by the sudden powerful action of his hitherto weakened muscles. Treatment on two successive days succeeded in establishing a "cure." R. P. left the brace and was able to walk proudly on his own legs. Within a month he was back to his job and has been working steadily ever since.

Prognosis and Treatment

THE prognosis in this group of cases is extremely unfavorable. Behind the conspicuous symptoms there operates frequently a deep-seated, neurotic mechanism. Then there is the obvious, psychologic gain, motivated by desire for safety, revenge, and thirdly, in the industrial cases, the illness is subsidized by weekly compensation payments. The doctor who treats such patients encounters not only the difficulties inherent in the usual neuroses, but he often must meet the problem of a professional neurotic—one whose symptoms enable him to make a livelihood.

Several of the suggestions for therapy have been given in a previous paper entitled. "The Treatment of the Neuroses, Associated with Trauma."[12] Of prime importance is a thorough examination, but this examination must look beyond the back and at the background. Frequently there is a basis of structural damage upon which the neurosis is superimposed. The disentangling of the structural from the functional, will aid the doctor in the proper perspective. In the process of such differentiation, the doctor may gain the patient's confidence, reassure him about his fears and guide him toward a happier therapeutic goal. The various details are discussed in textbooks and in other papers.

It is important on the negative side to differentiate the nervous back disorder from the purely organic one. This recognition may prevent measures which would fix the symptoms and prolong them. Barker cautions against certain surgical procedures with the phrase: "Orthopedists have even helped to fix the pathological idea by application of apparatus." We have seen patients who have had one to six back operations with little or no benefit. Local measures are always valuable but must be carried out with the recognition of their influence upon the psyche. Thus suggestion performed through electricity, injection or supporting measures may be effective. In the industrial group, rehabilitation or change of employment may be valuable. In all instances the removal of the purpose of

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the symptoms is important. If the doctor can direct a prompt settlement of compensation claims, a cure may be more easily attained.

Conclusion

THE purpose of this paper is to underscore vertebral neuroses particularly those resulting in industry after trauma. The physiologic mechanism for the symptoms is mentioned; the more important psychologic explanation is reviewed. The localization to the back depends on the influence of trauma and because of advantages to the psyche. In this group of cases it is important to look beyond the back and to study the background.

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Saving Eyes in Industry

IN ANY consideration of safety in industry the importance of safeguarding the eyes cannot be overestimated.* Ask a man which he would rather lose, his sight, an arm, or a leg. He will generally stop and think a few minutes but invariably the answer will be that he would be least willing to part with his sight even though he is a laborer and dependent upon his arms and legs for a livelihood. Yet how many men, until an accident occurs, actually give a thought to the eye hazards which they meet every day at work or home. Therefore it becomes the task of the employer and those connected with industry to consider these hazards, to guard against them, and to educate the employee to protect himself.

It is to the benefit of the employer to consider these dangers, not only for the sake of the employee, but for the company's sake as well. Any protection for the eye pays for itself a thousand times over since the eyes are the most vulnerable and the most expensive targets which workers present to industrial risks. The smallest spatter of acid or molten metal can rob a worker of his sight and directly cost his company several thousand dollars not including the indirect cost which invariably follows as a result of idle machine time, lost production, disrupted production schedules, and lowered efficiency of the workman himself. The National Society for the Prevention of Blindness has estimated that the direct cost of the loss of both eyes is about $8,000 including compensation, hospital care, and doctors' fees, and that the indirect cost can be estimated at four times the direct cost or about $32,000, making the entire cost of an eye accident which results in blindness approximately $40,000. Various estimates place the number of eye accidents at approximately 300,000 every year; over half of these are considered serious and several thousand result in outright loss of an eye.

The first thing to do in saving eyes in industry is to prevent hazards when possible and the second is to emphasize the necessity of the employee receiving proper care in the event of injury to the eye. Some of the industrial hazards to eyes are: flying objects as chips and fragments of metal; flakes of scale and paint; splashes of liquids and particles of dust and sand; glare; inadequate or injurious light; acid or strong acid fumes; blows from fellow workers or falling tools; burns; defective eyesight, which often is the cause of accidents frequently attributed to "carelessness."

What can industrial nurses do about these hazards? When the plant does not employ a safety engineer, nurses can encourage managements to equip workers with protective equipment necessary for a particular occupation. In recommending the purchase of goggles, head masks, and respirators, care should be taken that they conform with the requirements set forth in the "National Safety Code for the Protection of the Heads and Eyes of Industrial Workers."[1] Once proper equipment is supplied nurses can make a real contribution in teaching workers the value of and the necessity for personal protection and safety.

Goggles are excellent safeguards but they must be worn to prevent eye accidents, and to be worn they must be comfortable. The most elaborate enforcement measures are only partially effective in getting men to wear goggles that are uncomfortable. Goggles must also be suitable for the type of work. For protection from glare and injurious light such as ultra-violet rays, they must be chemically compounded to screen out the injurious light rays, yet permit a clear view of working details. For protection in sand blasting, since it is also necessary to protect the nose and throat, the mask must be constructed in such a way that there is no fogging of the lenses of the goggles. This also holds true for metal pourers and cinder men around cupolas and blast furnaces. For welding, chipping and similar operations, the lenses must be strong enough to resist flying particles. When working around such dangerous fumes as ammonium chloride and chlorine, it is necessary to protect the lungs hence a mask is used, which also protects the eyes.

Injuries from blows and falling objects can only be avoided by educating the worker to be careful. Tools must not be left in dangerous places. An object weighing three pounds falling 20 feet will hit with the same force as an object weighing 20 pounds falling three feet.

It is difficult to secure reliable estimates of all the accidents which are caused as a result of defective vision. But the number is undoubtedly large enough to point out the need for discovering and correcting eye difficulties at the time of employment, not only for personal safety of the employee, but also of his fellow workers. It is advisable to include an eye examination in periodic health examination of employees since the eyes are in a dynamic state throughout life and are often affected by general health.

Many workmen with defective vision can have their vision brought within its normal range by wearing properly prescribed glasses. Others may need special eye care or general health measures. One day an older employee who was suffering from undiagnosed glaucoma had a minor accident. He had failed to see an approaching carrier. To the industrial nurse the accident was more than an abrasion on the arm which needed first aid treatment. Tactful questioning brought out the fact that he had not seen the approaching carrier. An examination by the plant physician, followed by an examination by the ophthalmologist, revealed the presence of glaucoma, and that the fields of vision were impaired leaving only central vision. Such loss of or greatly reduced peripheral vision decreases the efficiency of sight and is like being compelled to go through life seeing straight ahead through a small tube.

Another worker, a young man, reported to the nurse that his eyes "hurt all the time." It was found that he was suffering from an inflammatory eye condition due to syphilis. In her follow-up work the nurse not only assisted the worker to secure treatment for himself but arranged for the examination and treatment of other members of his family.

The average working man needs the encouragement and help the industrial nurse can give in interpreting the need for adequate care and in assisting workmen to obtain clinical care if they are unable to pay for private medical care or can pay only a minimum fee. Often a letter or visit to the clinic by the nurse results in the patient carrying out the treatment, and makes for better understanding between the clinic and the workman.

It is not unusual to find an employee suffering from an infectious eye disease and spreading it to other workers because of close and unsanitary facilities. The nurse can be

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* VIVIAN V. JONES, R.N., Fibreboard Products Company, Los Angeles, California, in *Public Health Nursing*, June, 1937.

1. Bureau of Standards Handbook. Series No. 2. Government Printing Office, Washington, D. C. 10 cents.

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of valuable assistance in preventing the spread of disease by creating an environment which eliminates these conditions.

In the event of an injury or foreign body in the eye proper care should be given immediately. Too frequently it happens that an employee gets a foreign body in the eye and either attempts to remove it himself or asks his fellow worker to do so. The results of such treatment are well known. Even the slightest injury may lead to seriously impaired vision or blindness. The employee often feels that every time he has a reportable accident it goes against his record; that a foreign body can be easily removed by someone who is as "handy" as the company physician or nurse; and that it will save him time if he does not report. This viewpoint can be overcome by working toward a better understanding between the worker, the nurse and the employer. It too often happens that although the plant nurse would not think of touching an eye that has been injured or has a deeply lodged foreign body in it, yet a workman with a soiled handkerchief will undertake first aid treatment.

One other important eye hazard to consider is improper or inadequate illumination. While lighting practices are not the especial province of the industrial nurse, she can promote an interest in securing adequate standards of illumination for various tasks. She should know what constitutes good lighting, and can easily assist in checking illumination by using a foot-candle meter to determine whether the illumination is in conformance with the minimum intensities of light recommended in the "Code of Lighting Factories, Mills, and Other Work Places."[2]

"Saving Eyes in Industry" is a big subject and it is impossible to include all the points of major importance in so brief an article. How much the industrial nurse can accomplish depends pretty largely upon her knowledge and interest in this particular phase of her work. Certainly as long as eyes continue to be lost in industry there is an urgent need to use every precaution to prevent such loss.

Insurance Assignment Plan: Illinois

FOLLOWING the enactment of the Occupational Diseases Act last year, a number of employers engaged in dusty operations found that insurance companies generally were unwilling to write occupational disease insurance except at high rates and following compliance with elaborate dust control measures, some of which were extreme and unnecessary, and, in many cases, the dismissal or transfer of employees who showed any evidence of occupational disease or tendency thereto.

This condition was soon followed by an attempt on the part of the majority of insurance companies to cooperate with the Industrial Commission in the adoption of a plan by means of which the Commission would assign an insurance company to carry an employer's occupational disease risk following rejection of the insurance by several companies. Most of the insurance companies voluntarily subscribed to this plan. However, a few companies refused to do so, which made it necessary to enact a law along the same lines compelling all insurance companies to participate in the plan.

This law is now in force and is variously known as the "assigned risk plan," "rejected risk plan," or the "pool plan." The details of the pool arrangements have been worked out by the insurance companies in a manner satisfactory to the Industrial Commission and the Commission is now in a position to proceed with the assignment of employers who so request.

Briefly the law provides that an employer unable to obtain either compensation or occupational disease insurance by direct application to three insurance companies may apply to the Industrial Commission for an insurance company to be assigned to carry its risk.

The insurance company is required to issue a policy immediately at rates reasonably commensurate with the risk involved.

Policies to be issued are the standard form and must cover the employer's entire liability, meaning that it will not be necessary to discharge non-disabled employees who show some evidence of or tendency

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2. Code of Lighting Factories, Mills, and Other Work Places. Illuminating Engineering Society, 51 Madison Avenue, New York, N. Y., 1930. 20 cents.

to industrial disease in order to obtain coverage.

Suitable provisions are made for the employer to appeal to the Industrial Commission for hearings on rates and premiums charged as well as on cancellation notices.

An insurance company is not required to issue occupational disease insurance unless the employer also authorizes the same insurance company to carry compensation insurance.

In order to qualify for insurance, the employer must make suitable provisions for paying the premiums and must not be in default of compensation or occupational disease insurance premiums contracted during the year previous and further, must satisfy the Commission that he has complied or will comply substantially with all effective laws, rules and regulations *made by public authorities** for the welfare, health and safety of employees.

When once assigned under this plan, an employer may not obtain insurance otherwise except by reimbursing the "pool" for any excess of losses over premiums.

Failure of an insurance company to subscribe to the plan in accordance with the rules of the Industrial Commission can result in suspension of the insurance company's license to do any business in this State.

The laws, rules and regulations above referred to include:

Health, Safety and Comfort Law—"Old"—Repeal extended to March 1, 1938 to allow more time for the adoption of rules and regulations under the new Health and Safety Act.

Health and Safety Act—"New"—Effective July 1, 1936. No rules or regulations purusant to this Act have been adopted to date.

Grinding, Buffing and Polishing Equipment Sanitation Act—Requires exhaust on grinding equipment.

Wash House Act—Law revised at recent session of legislature to require soap, drinking water, and that washrooms shall have a space of seven square feet per man regularly dressing in such washroom at one time.

The Basement Blower Act, or Manufacture Above Ground, Act is no longer effective. It was declared unconstitutional by the State Supreme Court.

"Compel Doctors to Aid Indigents"

WASHINGTON, D. C., July 28.—(Special.)**—A bill which would make all physicians and surgeons in the country. "civil officers of the United States" and require them to give any medical aid requested by an impoverished individual was introduced in the senate today by Senator James Hamilton Lewis (D., Ill.).

The proposal provides that physicians and hospitals giving service to indigent individuals would be authorized to sibmit bills to the social security board for payment.

There would be penalties, including a fine of not more than $1,000 and imprisonment of not more than three months, for any doctor who refused to give aid to an indigent person or who submitted a fraudulent or exorbitant bill to the social security board.

In a preamble to the bill the Illinois senator set forth the grounds on which he bases his proposal.

Pointing out that the federal government now has recognized its social responsibility to its citizens by the enactment of the social security act, Lewis declared that an extension of such responsibility is necessary to provide adequate medical care and attention for the impoverished and needy "to assure the full enjoyment of social security."

* Bulletin of Workmen's Compensation-Health and Safety Bureau, CLARK D. BRIDGES. Director; Illinois Manufacturers Association.

** Chicago Tribune, July 29, 1937.

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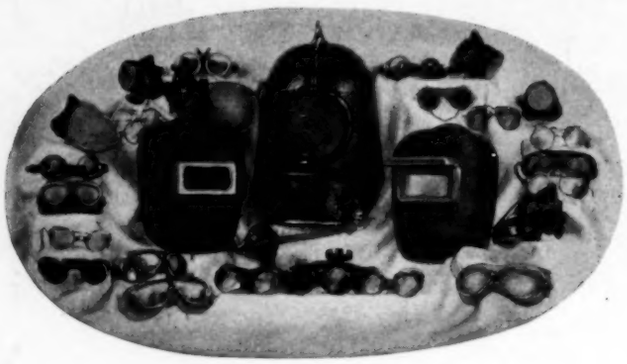

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Lewis first made his suggestion in a speech before the medical association convention in Atlantic City, N. J., early in June. At that time he asked the association for advice in formulating a public health policy.

By the assertion he had "just talked to the President," the senator gave at least some of his convention listeners the idea he was carrying a message from Mr. Roosevelt. Others were convinced, however, the Chicago legislator was acting entirely on his own.

Lewis says himself he offered the bill on his own responsibility; that it was proposed by no organization or interest. He also admitted his speech in Atlantic City stirred up a great controversy and that the A. M. A. wrote a letter to Mr. Roosevelt expressing their apprehensions about the advisability of such a law.

In Chicago, Dr. Olin West, secretary of the medical association, termed it the "most complete regimentation of physicians that possibly could be accomplished."

"From press dispatches—I haven't yet seen a copy of the bill—the Lewis measure appears opposed to every policy that the organized medical profession has stood for," said Dr. West.

Industrial Hygiene Seminar

AN INDUSTRIAL Hygiene Seminar was held from May 17 to June 5, inclusive, under the auspices of the Division of Industrial Hygiene and Sanitation of the U. S. Public Health Service. The purpose of the Seminar was to provide intensive training for personnel undertaking new work in the field of industrial hygiene. Representatives from the health departments of more than 30 States were in attendance. Taking part in the lectures, in addition to Public Health officers, were several representatives of established State bureaus of industrial hygiene. Included in this latter group were Dr. Leonard Greenburg, Executive Director of the New York State Division of Industrial Hygiene, and Mr. Manfred Bowditch, Director of the Massachusetts Division of Occupational Hygiene. The Seminar expressed itself as desirous of wholeheartedly cooperating with State departments of labor, departments of mines, industrial commissions, organized labor and industry in the furtherance of a general program to improve and protect the workers' health.

Recent Publications

BULLETIN No. 10—DISCUSSION OF INDUSTRIAL ACCIDENTS AND DISEASES—Proceedings of the 1936 Convention of the International Association of Industrial Accident Boards and Commissions, Topeka, Kansas—is now available.*

Bulletin No. 13—NATIONAL SILICOSIS CONFERENCE—Summary Reports Submitted to the Secretary of Labor by Conference Committees. The four committees whose reports are summarized were:

1. Committee on the Prevention of Silicosis through Medical Control;
2. Committee on the Prevention of Silicosis through Engineering Control;
3. Committee on the Economic, Legal and Insurance Phases of the Silicosis Problem; and
4. Committee on the Regulatory and Administrative Phases of the Silicosis Problem.

Public Health Bulletin No. 236—EVALUATION OF THE INDUSTRIAL HYGIENE PROBLEMS OF A STATE—details a method for handling these problems and reports the results of the application of the methods in the State of Maryland. The use of the procedure, as outlined in the bulletin, by other State agencies should result in a better understanding of the occupational exposure to certain materials which may be hazardous to health.

An article entitled "The Pathology of the New Commercial Solvents" by A. V. St. George, which appeared in the June, 1937, issue of the *American Journal of Clinical Pathology*, should prove of special interest to industrial physicians, as well as to industrial and labor organizations interested in the protection of the workers' health. Difficulties in detecting injury or arriving at a diagnosis are discussed. The author lists the effects of 23 solvents and the industries in which they are chiefly used, and points out the importance of remembering that although excessive exposure to the compounds may produce serious disability or even fatal results, all may be used safely provided proper attention is given to the prevention of personal contact and to the escape of the fumes of these solvents into the healthy atmosphere.

* Division of Labor Standards, U. S. Dept. of Labor, Washington, D. C.